Mining CONGRESS JOURNAL

AMERICAN MINING CONGRESS

JULY
1955

70 NORDBERG GRINDING MILLS and 37 SYMONS® CONE CRUSHERS for processing TACONITE in the Lake Superior Iron Ore Region...

SYMONS® CONE CRUSHERS and NORDBERG GRINDING MILLS have long proved their efficiency, dependability and economy in the profitable reduction of ores and minerals the world over. In the case of *TACONITE*, one of the hardest and toughest of all ores to process, the mining fraternity again depends on Symons Cone Crushers and Nordberg Grinding Mills for the economical production of large tonnages of fine crushed and milled product . . . as evidenced by the fact that, following extensive tests and research in pilot plants, 37 Symons Cones and 70 Nordberg Rod and Ball Mills were recently ordered for delivery to the mammoth reduction works now under construction in Northern Minnesota.

The thirty-seven Symons Cone Crushers . . . all Super Heavy 7-foot types, have been given the difficult assignment of secondary and tertiary crushing of the hard, tough Taconite Iron Ores. The seventy Nordberg Rod and Ball Mills were selected to meet the exacting requirements for primary and secondary grinding. Included are 33 rod mills—twenty-nine 10′ x 14′ units and four 10′ x 16′ units . . . as well as a total of thirty-seven 10′ x 14′ ball mills.

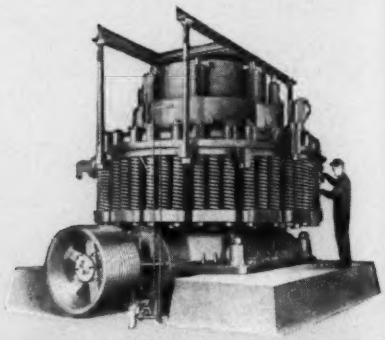
Thus, in Taconite operations . . . *as in all of the great ore and industrial mineral operations the world over . . .* NORDBERG MACHINERY is the outstanding preference among leading producers for processing great quantities of finely crushed and ground product at low cost.

Write for further information on the machinery you need.

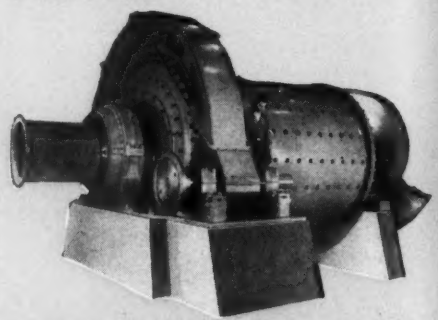
NORDBERG MFG. CO., Milwaukee, Wis.

SYMONS . . . A REGISTERED NORDBERG TRADEMARK KNOWN THROUGHOUT THE WORLD

M255



SYMONS CONE CRUSHERS . . . *the machines that revolutionized crushing practice* . . . are built in Standard, Short Head and Intermediate types, with crushing heads from 22″ to 7′ in diameter, in capacities from 6 to 900 tons per hour. Shown is a 7′ Super Heavy Unit as used for Taconite service.



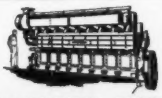
NORDBERG GRINDING MILLS are built in ball, rod, tube, pebble and compartment types for practically all wet and dry grinding operations. Shown is one of the 10′ x 14′ Ball Mills for Taconite service.

SYMONS GYRATORY CRUSHERS

NORDBERG KILNS and COOLERS

SYMONS VIBRATING GRIZZLIES and SCREENS

NORDBERG MINE HOISTS



NORDBERG DIESEL—DUAFUEL® and SPARK-IGNITION GAS ENGINES

NORDBERG MACHINERY

NORDBERG

CRUSHERS SYMONS SCREENS NORDBERG

MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

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You Get Your Round in Faster

...and lower your drilling costs with a CLEVELAND Air Leg and Drill Combination

Cleveland Air Legs and Drills have these important essentials — easier handling, higher drilling speed, and sturdy dependability — that enable your miners to increase the footage they can drill per man-shift.

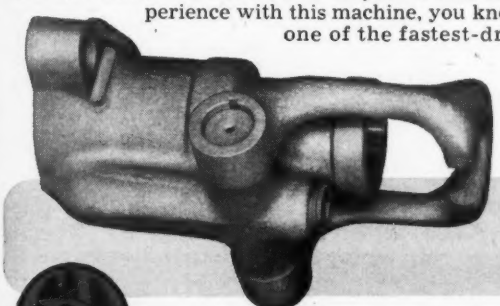
Here's why Cleveland Air Legs and Drills are easier to handle — Only Cleveland gives you an air leg and drill with a built-in 11-position feed control. It eliminates a third hose and cumbersome "Y" connections, reducing the weight a miner has to handle. No feed-control bleed valve is required either so that the operator doesn't have to bleed off air continuously to maintain suitable feeding pressure. And a new, quick-opening steel puller makes steel changing easier and faster.

Here's why Cleveland Air Legs and Drills have higher drilling speed — First of all, the Cleveland Air Leg uses the Cleveland H-10 drill. If you've had any experience with this machine, you know it's one of the fastest-drilling sinker drills made today. Then you have the built-in feed control that provides 11 feeding positions from zero to full-line pressure — with an increase of 9 psi at each setting. It lets the operator adjust the feed so that the drill is always down on the collar of the shank for maximum drilling speed, regardless of varying rock conditions.

Here's why Cleveland Air Legs and Drills stay underground longer — The Cleveland H10 drill is a proved performer, not only in the matter of drilling speed but also in upkeep cost. It's built to take it. And the Cleveland Air Leg holds the drill in line with the hole — thus reducing front-end drill wear and practically eliminating rotation strains. Moreover, the new steel puller helps to reduce maintenance costs still further. It consists of only five parts — there's only one spring and one plunger, and it's lubricated from the inside to prevent wear and to wash out dirt.

Four types available — There are four types of Cleveland Air Legs having conventional or telescopic, 3-ft., 4-ft., or 5-ft. feeds. Some models will take any 35-lb., 45-lb., or 55-lb. drill. Write for bulletin RD-30 that describes the Cleveland Air Leg in detail—the Air Leg that can help you get your rounds in faster for lower costs.

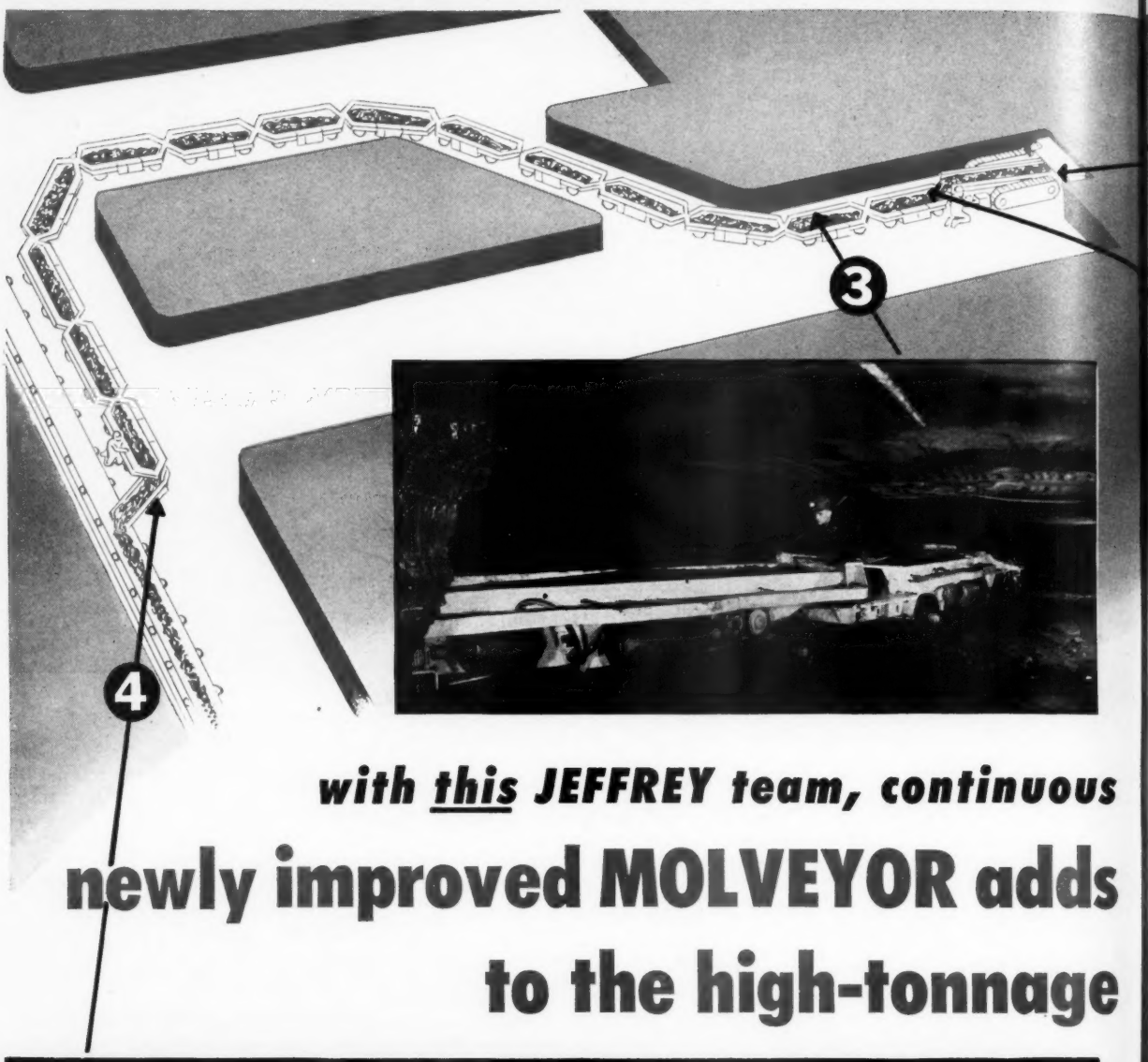
RD-65



Close-up view of new Cleveland Steel Puller. It consists of only 5 parts and has one spring and one plunger. Lubricated from the inside to assure easy operation and to flush out dirt, this new steel puller is also easy to assemble and disassemble.

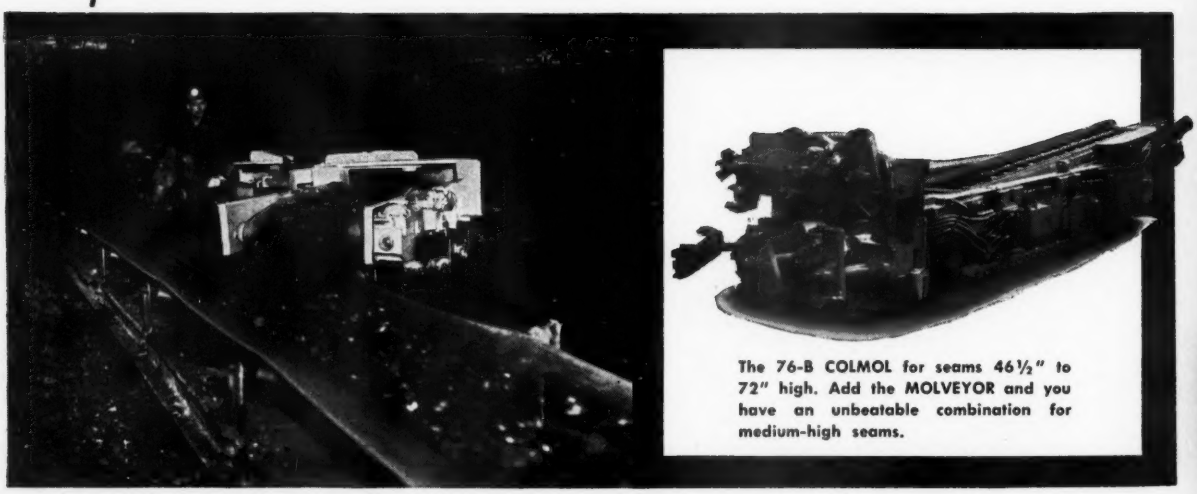
CLEVELAND ROCK DRILL DIVISION
Westinghouse Air Brake Co.

12500 BEREA ROAD
CLEVELAND 11, OHIO



with <u>this</u> JEFFREY team, continuous

newly improved MOLVEYOR adds to the high-tonnage

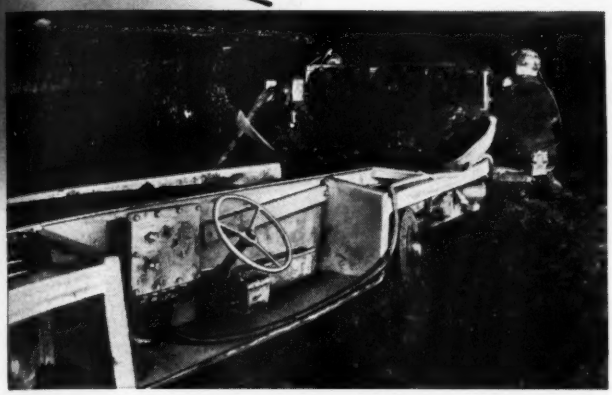


The 76-B COLMOL for seams 46½" to 72" high. Add the MOLVEYOR and you have an unbeatable combination for medium-high seams.

1

The 76-AM COLMOL, available in three heights for cutting seams 38" upward. It teams with the MOLVEYOR for big tonnage in low vein coal.

2



means continuous

flexible haulage COLMOL . . .

When the Jeffrey COLMOL hits its 80-tons/man-shift stride, haulage becomes the only problem standing in the way of real 100% high-tonnage continuous mining. But here comes the MOLVEYOR to solve that . . . a conveyor so flexible it hauls that much coal away without interruption.

The COLMOL-MOLVEYOR team is the biggest producing, most versatile continuous mining system introduced to date. Compare it with any other combination on the market.

The COLMOL advances straight into the solid seam of coal, cutting an area the full width and height of its cutting head and to any determined room depth. Coal is mined by the boring action of cutter arms. It is carried on the COLMOL'S conveyor to the rear of the machine and into . . .

The MOLVEYOR, a string of connected belt conveyor sections mounted on wheels. Each section is 15 feet long, and in a train is capable of reaching 300 feet or more from the face to the main haulage system. The MOLVEYOR advances on its own power right behind the COLMOL, trailing perfectly, thanks to unified steering. From entries it "snakes" around room necks, into rooms and through cross-cuts, carrying back an uninterrupted flow of coal.

The Coal Really Rolls

When the coal starts rolling with this system, it keeps on rolling. The COLMOL produces up to 80 tons per man shift . . . and the MOLVEYOR hauls it away with no waiting for intermediate transportation.

Remember this! No other continuous-type mining machine can produce more coal than the COLMOL in mines where the Jeffrey unit can work . . . and no other connecting conveyor is as flexible as the MOLVEYOR.

With Jeffrey continuous *means* continuous . . . and real high-tonnage continuous mining calls for the COLMOL-MOLVEYOR combination.

JM THE JEFFREY

ESTABLISHED 1877
MANUFACTURING CO.
Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA.

IF IT'S MINED, PROCESSED OR MOVED
. . .IT'S A JOB FOR JEFFREY!

LOOKING FOR WAYS TO SAVE MONEY? TRY THIS ONE:

If you're not already using "National" brushes on rotating d-c equipment throughout your mine or mill, prove to yourself that this traditionally dependable brush line can effect the following savings for your department:

- **Longer Brush Life** — "National" brushes give you the most hours of trouble-free service consistent with other important performance factors. National Carbon research is continually at work on this and other features of "National" brushes.

- **Lower Maintenance** — Often much more important than frequency of brush replacement is commutator condition — a direct result of brush performance. The excellent commutating ability and low friction of "National" brushes contribute to low-cost commutator care.

- **Uniformity** — Brush quality is a link in the chain of dependability upon which uninterrupted service of your equipment depends. National Carbon's inspection procedure is designed to assure you of the same uniformly high quality year after year, from box to box and shipment to shipment.

Brush selection is neither a small nor a simple thing. Install "National" brushes in accordance with recommendations of a National Carbon representative. Then expect and *get* the lowest overall brush cost you ever had!

Are you getting the "Brush Digest"? Many thousands of this free, serialized, motor maintenance course are being distributed to their men by electrical and maintenance supervisors. Write for your copies today!

JULY, 1955

VOLUME 41 ● NUMBER 7

Mining

CONGRESS JOURNAL

CONTENTS

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FRONT COVER: Almost 100 miles southwest of Grand Junction, Colo., at Uravan, is the uranium ore-processing mill of United States Vanadium Co. (Photo courtesy of U. S. Vanadium Co., a division of Union Carbide and Carbon Corp.)

THE AMERICAN MINING CONGRESS
RING BLDG., WASHINGTON 6, D. C.

IN OHIO . . . AND THE WORLD OVER

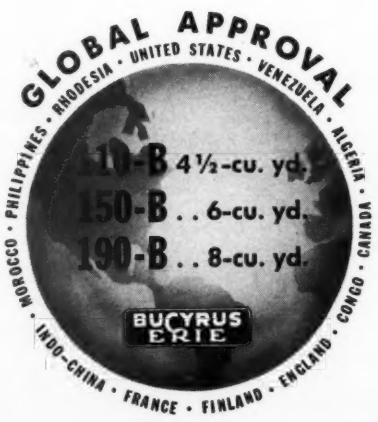
Coal Men Look to Bucyrus-Eries for Real Cost-Cutting Performance

Equipped with special 7½-cu. yd. dipper, this 150-B shovel loads coal from pit near Lexington, Ohio. A 45-cu. yd. Bucyrus-Erie 1050-B shovel is used here, too, for stripping overburden.

With Bucyrus-Erie shovels, like the Model 150-B shown here, experienced mine operators are cutting costs today right where they begin — in the pits. These heavy-duty excavators, because of their advanced design and construction, offer performance that means high output at low cost per yard.

Front-end design is a good example of how Bucyrus-Erie builds better performance into shovels. The unique, two-piece boom is exceptionally strong, rigidly braced to the A-frame with steel members, and has widespread boom feet. It takes digging stresses from all directions. Yet, with all its strength, its weight is light. Crowd machinery is on the revolving frame — not on the boom. Power is applied to swinging profit-making payload, not moving dead weight.

Let experience be your guide when choosing your next loading shovel — the experience of satisfied owners who have found Bucyrus-Erie Ward Leonard electric excavators give them the big output, low cost performance they need. 45L55



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Wisconsin

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get AMERICAN Explosives

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Manufacturing plants and distributing magazines are well placed to fill your orders fast... to get AMERICAN explosives to you when and where you need them. You can bank on AMERICAN performance, too. Years of research and close production control give you positive results on every shot you make. So call your shot with AMERICAN today.

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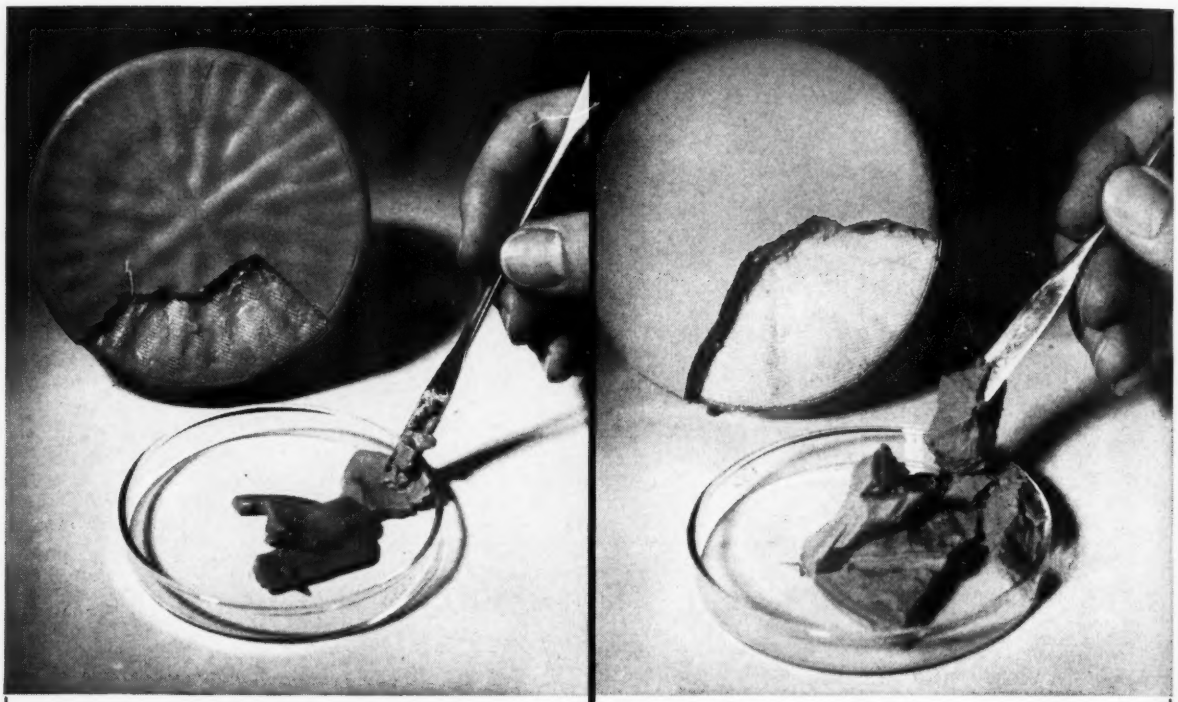
Separan 2610

GREATLY IMPROVES FILTRATION



Above picture shows thin cake formed on filter with untreated solids. Cycle includes 15-second cake formation and 45-second drying time.

During the same cycle, a much thicker cake is formed by treating with 0.15 lb. of SEPARAN 2610 per ton of dry solids present.

New flocculating agent speeds up filtration and settling rates, brings many other improvements to liquid-solid separations

THE DOW CHEMICAL COMPANY
Dept. TS 739E, Midland, Michigan

Please send me information and a trial sample of SEPARAN 2610.

Name_____

Company_____

Address_____

City_____ State_____

Prove to yourself the advantages of Separan* 2610 in filtration.

1. Increased cake size
2. Decreased cake moisture and better washability
3. Easy to handle and less dusty cake
4. Less material loss in filtrate
5. Effective over wide pH range

Prove to yourself the advantages of Separan 2610 in settling.

1. Up to 40 times faster settling rate
2. Increased overhead clarity
3. Less materials loss in overhead
4. Reduced cost in acid and alkaline media
5. Increased plant capacity

SEPARAN 2610 is highly effective in these industries:

- Uranium
- Clay
- Borax
- Cement
- Alum
- Potash
- Foundry Sand
- Coal
- Phosphoric Acid
- Iron Ore and Taconite
- Industrial Water, and Waste
- Miscellaneous Metals

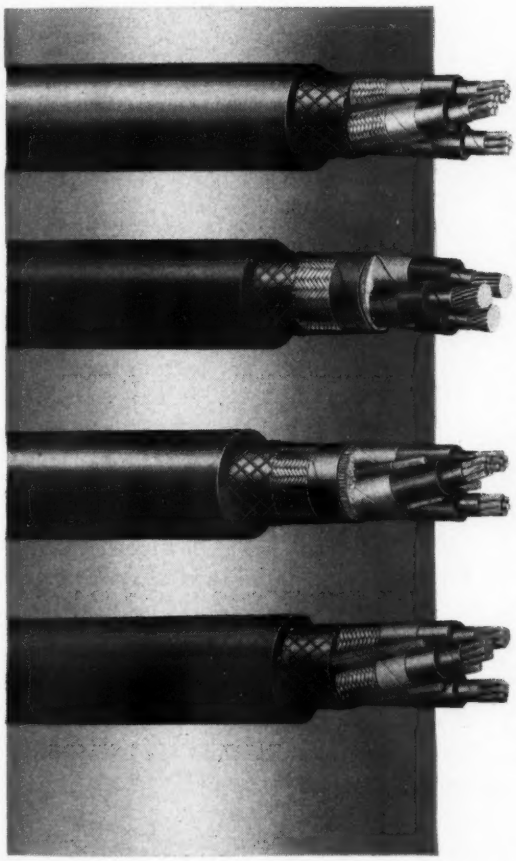
*Trademark of The Dow Chemical Company

you can depend on DOW CHEMICALS

DOW

Avoid costly "Downtime" with U. S. Royal Shielded Portable Power Cables

Shielded Portable Power Cables, Type SH, are preferred (or generally used) for the distribution of power to portable equipment at voltages above 2000. Shielded cables provide greater protection to the insulation and are safer to handle than other types of portable cables. These cables are of the four types listed below. Where maximum safety is desired, type SH-D cables are recommended.



U. S. Royal SH-A Cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S Uskorona-1 oil base compound, and covered with colored tapes and a braided coated copper shield. The conductors are then cabled and covered with a reinforced jacket of 60% black neoprene. The shielded braid over each insulated conductor eliminates corona cutting by static discharge through equalization of surface stresses.

SH-B cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound plus colored tapes. Conductors are then cabled with jute fillers, covered with a rubber-filled tape, a braided coated copper shield and reinforced 60% black neoprene jacket. The shielding braid protects the men handling the cable in the event of fault currents.

SH-C cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound and covered with a colored tape. The conductors are cabled with jute fillers and with the specified fabric-covered ground wires in the conductor interstices; then covered with a rubber-filled tape, braided coated copper shield and a reinforced 60% black neoprene jacket. This allows grounding of equipment and provides an adequate low-resistance path for short circuits, thus insuring circuit breaker operation. The grounded equipment provides protection to workmen under fault conditions.

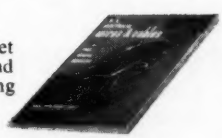
SH-D cables consist of three or four flexible coated annealed copper conductors covered with a semi-conducting tape. Each conductor is insulated with U. S. Uskorona-1 oil base compound and covered with a colored tape and a braided coated copper shield. The conductors, together with fabric-covered grounding conductors, are cabled and covered with a reinforced black 60% neoprene jacket. The conductor shielding, when properly grounded, equalizes surface stresses and draws off all capacity charging currents, insuring safety in handling. An adequate low-resistance ground for the equipment is provided by the grounding conductors.

All shields and grounding conductors, when used, should be properly and thoroughly grounded.

The constant dragging, flexing, twisting and bruising encountered in heavy service will not bother U. S. Royal Shielded Cables. You'll find that U. S. Royal never runs you into "downtime"—it's the most dependable, efficient cable you've ever used.

United States Rubber Company is the only electrical wire and cable manufacturer to grow its own natural rubber, make its own synthetic rubber and its own plastics. This permits control of the production process—resulting in a quality product.

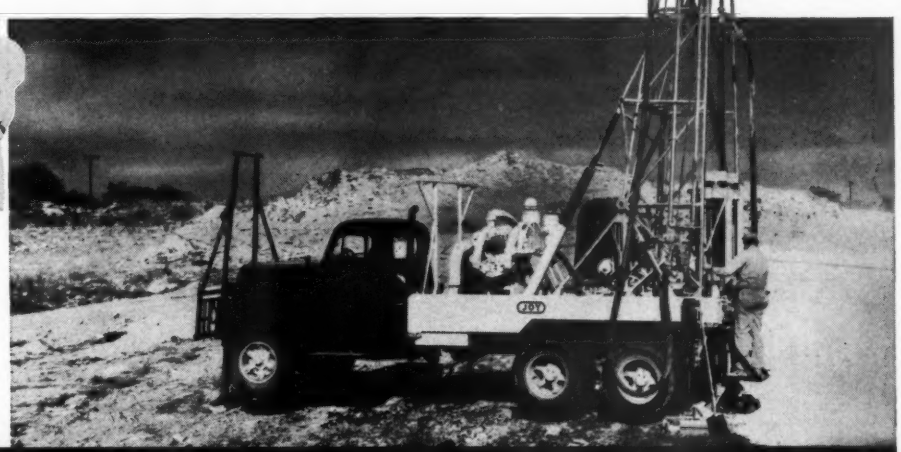
Send for illustrated booklet on U. S. Electrical Wires and Cables for the coal mining industry.



UNITED STATES RUBBER COMPANY
ELECTRICAL WIRE AND CABLE DEPARTMENT, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

US RUBBER

They're drilling Limestone for NEXT-TO-NOTHING A YARD...



...with this JOY "Blastair Drill"

In a Texas limestone quarry, a Joy Model 225 "Blastair" Drill set the following performance record . . . with a drilling cost of *less than two cents a cubic yard:*

Bit Size		6¼"
Footage Per Shift		300
Labor Cost Per Shift (Driller & Helper)	$20.80	
Fuel Cost Per Shift	5.00	
Lubricating Oil Cost Per Shift	2.00	
Total Labor & Fuel Cost Per Shift		$27.80
Labor & Fuel Cost Per Foot	$ .093	
Bit Cost Per Foot	.134	
Total Labor, Fuel, Bit Cost Per Foot		.227
Cubic Yards Broken Per Foot		13
Total Drilling Costs Per Cubic Yard		.0174

Performance figures will vary, of course, with other formations. However, they show the possibilities of cutting *your* drilling costs with this outstanding Joy drill.

The "Blastair" is a truck-mounted, rotary, "air-blast" drill. It is a fast mover between holes and is easy to set up in drilling position. Its outstanding features include hydraulic automatic chuck, heavy-duty hoisting drum, oil-bath chain-case power unit, and rugged sectional mast. It is a real top-performance, low-maintenance machine that is ideal for the rough jobs of quarry and open-cut mine drilling.

Find out for yourself how the Joy "Blastair" can cut drilling costs on your job as it did this. Write today for Bulletin RM-709 to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

GASOLINE OR DIESEL DRIVE • 6¼" MAX. DIA. HOLE
20' FEED • DRAG OR ROTARY-CONE TYPE BITS

Consult a Joy Engineer

OR WRITE FOR BULLETIN RM-709

W&D M5585

JOY

PIONEER AND WORLD'S LARGEST MANUFACTURER OF ROTARY BLAST HOLE DRILLS

STANOLITH MP Grease—a single grease—lubricates all equipment at Wright Mine

THE BOONVILLE COLLIERIES Corporation's Wright Mine uses STANOLITH MP Grease to lubricate all grease-lubricated bearings. To Wright Mine management this is good business. Using a single but multi-purpose grease, the management finds, cuts grease inventories, reduces grease dispensing equipment and, in application, eliminates costly dispensing mistakes.

Roller, ball, plain, and needle bearings are lubricated by this one grease. This applies to all mine equipment—Marion stripper, loading shovel and dragline; 7 Euclid 45-ton coal haulers; two Caterpillar D8 Bulldozers and two International Harvester tractors.

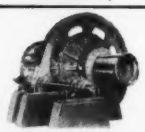
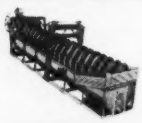
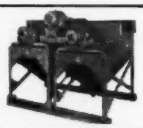
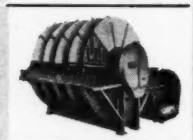
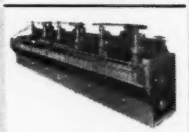
Using STANOLITH MP Grease saves Wright Mine money. It can save you money, too. Find out. In the Midwest, call your nearby Standard Oil lubrication specialist. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Marlin Carter, Wright Mine pit foreman (right), and Oscar Daussman, Standard Oil lubrication specialist, discuss equipment lubrication. Oscar is an old hand at providing technical service on lubrication problems. He has had more than 30 years' experience with Standard Oil, much of it working with customers on such lubrication jobs as this one at Wright Mine. Customers find this experience pays off *for them.*

STANDARD

STANDARD OIL COMPANY
(Indiana)

Complete DENVER MILL EQUIPMENT

		SIZES		WRITE FOR
DENVER (Patented) **SUPER AGITATORS & CONDITIONERS**		3' x 3' to 20' x 20'	Patented standpipe around propeller shaft assures positive agitation and circulation. Patented weir collar prevents sand-up on shut-down. Heavy-duty as well as acid-proof construction is available.	Bulletin No. A2-B4
DENVER Steel-Head **BALL MILLS**		3' x 2' to 6' x 12'	A Denver Steel-Head Ball Mill will suit your particular need. Five types of discharge trunnions. All-steel construction. Low initial cost due to quantity production. Quick delivery. Laboratory and pilot plant mills also available.	Bulletin No. B2-B13
DENVER Forced-Feed **JAW CRUSHER**		2¼" x 3½" to 32" x 40"	Cast steel frame, manganese jaw and cheek plates. Large diameter shafts reduce shaft deflection and thus increase life of heavy-duty, oversize roller bearings in bumper. Setting easily controlled.	Bulletin No. C12-B12
DENVER Spiral **CLASSIFIER**		6" Simplex to 60" Duplex	Has many improvements. For instance, lower bearing placed above pulp level, arrangement of feed, overflow and direction of rotation result in maximum efficiency. Rake-type and Denver-Finney classifiers also available.	Bulletin No. C5C-B
DENVER Selective **MINERAL JIG**		4" x 6" Simplex to 36" x 48" Duplex	An improved, pulsating, gravity selector that treats unclassified, unsized feed and recovers minerals as soon as freed. Easy to regulate and control, minimum attention. Use in closed grinding circuit or open circuit.	Bulletin No. J2-B10
DENVER Disc **FILTERS**		1 Disc, 2' to 8 Disc, 6'	Special, patented design of segments in Denver Disc Filters use both gravity and vacuum to give a drier filter cake. Drainage is complete and positive, with no blow-back. Simple, low-cost, dependable construction. Quick delivery. Also Drum and Pan Filters.	Bulletin No. F9-B2
DENVER "Sub-A" **FLOTATION**		16" x 16" to 56" x 56"	More large plants are installing Denver "Sub-A's" for their entire flotation job — roughing, scavenging, cleaning and re-cleaning — because they give maximum recovery at a low cost per ton. Dependable, low-cost, simplified continuous operation.	Bulletin No. F10-B8
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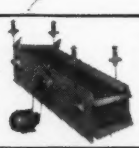
DENVER Dillon **SCREENS**		1' x 3' to 6' x 14'	Gives fast, clean separation without blinding. Gives even, smooth flow of material because of the patented "true-circle" eccentric action. Two bearing construction saves 50% HP.	Bulletin No. S3-B11
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CASE HISTORY No. 5310-109

USER: Certain-Teed Products Corporation, Grand Rapids, Michigan.

INSTALLATION: GM "3-71" Diesel drives 250-volt generator powering Joy shuttle car in underground gypsum mine. Scrubber used on exhaust.

PERFORMANCE: Unit working up to 15 hours a day hauling ore up 12% grade to crusher. Fuel cost--$1.70 per day. Maintains full speed all day long instead of slowing up after 5 or 6 hours as their battery-powered cars do. Plant engineer Art Lund says GM Diesel-powered unit is "more economical than we planned on."

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★ Mining CONGRESS JOURNAL ★

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Towards Greater Safety

FUNDS totaling $18,863,000 have been made available to the U. S. Bureau of Mines for the fiscal year 1956. The appropriation approved by the Congress and signed into law by the President is the exact amount requested by the Department of the Interior. It represents a $6,637,000 reduction from the 1955 appropriations.

Of the total, $5,000,000 is earmarked for the Bureau's Health and Safety Programs. These funds will be used to continue research, investigations, training and coal mine inspection in the all-out drive to lower accident rates in the mineral and allied industries.

Commenting on the appropriation and its disposition, U. S. Bureau of Mines Director John J. Forbes said, "Although no new programs are contemplated in this field, there will be greater emphasis upon preventing roof fall accidents, particularly in coal mines."

For the five months, January through May, of this year, fatality frequency rates in the coal industry dropped to 0.90 per million tons of coal mined and 1.03 per million man-hours of exposure. Both these figures show an improvement over the same period last year when the figures were 1.04 and 1.05 respectively.

Every improvement is encouraging but there were two more deaths in 1955—173 compared to 171 in 1954. Actually the change in total is the result of some reductions and some increases; there were four fewer haulage fatalities; three fewer deaths due to electricity; four fewer fatal surface accidents and one less in strip mines. Against these 12 must be balanced increases of two fatalities due to local dust explosions; two due to explosives, two due to "all other" causes and an increase of eight from falls of roof, face or rib.

Of the total of 148 fatalities underground in the first five months of 1955, 100 were due to falls of roof, face or rib. Thus the Number 1 Killer in our coal mines still retained its position.

It seems paradoxical that in spite of the nationwide intensive drive to decrease the number of roof fall accidents, the number of fatalities from this cause has increased.

While possibly five percent, or less, of all mine accidents are unavoidable, the other 95 percent can be prevented. Advances in mining technology and equipment plus great strides in roof support methods have helped tremendously in the fight for safer mining. But only employes who can recognize a hazard and know how to cope with it can prevent accidents.

Thus, education in safety is of prime importance—education and cooperation on all levels. Every mining man from top management to track-cleaner should join in the U. S. Bureau of Mines program to help prevent roof-fall accidents. This means 100 percent participation in accident prevention courses and conscientious application of the lessons thus learned every minute of every working day.

The Consultants Report

ACCORDING to Public Law 108-83rd Congress, it is the policy of Congress "to promote economy, efficiency and improved service in the transaction of public business in the departments, bureaus, agencies, boards, commissions, offices, independent establishments and instrumentalities of the executive branch of the Government."

As a first step toward carrying out this policy, the Commission on Organization of the Executive Branch of the Government was established in July, 1953. With Ex-President Herbert C. Hoover as chairman it was popularly known as the Second Hoover Commission and was the subject of an editorial on this page in October 1953. At that time we pointed out that it was the job of Mr. Hoover and his associates, many of whom were prominent executives serving without pay, to simplify the governmental flowsheet with an eye to better recovery from the "ore" which the Internal Revenue Bureau extracts from us all.

On June 30, 1955, the Second Hoover Commission turned in its final report to Congress. In this document are summarized the recommendations made in 18 reports submitted previously. The Commission states that if its proposals are carried out, the savings realized will not only balance the budget, but allow a reduction in taxes as well. The substantial cuts in expenditures recommended to make this possible, it says, are based on elimination of waste and do not involve any reduction in military strength, any item of useful public works or any "delivered" Federal contribution to health, education or welfare.

As might be expected, with the far-sighted Mr. Hoover at the helm, the Commission's objectives were not purely financial in character. In making its recommendations, the Commission also kept in mind the objectives of:

Preserving the full security of our nation in a disturbed world.

Maintaining in operation all agencies necessary to the common welfare.

Stimulating research fundamental to the maintenance of national security and progress.

Improving the efficiency of all agencies.

Eliminating or reducing government competition with private enterprise, and

"Perhaps most important of all, to strengthen the economic, social and governmental structure which has brought us, now for 166 years, constant blessings and progress."

Among its recommendations, there were 145 which the Commission says are within the power of the various departments and agencies to adopt, and 167 which will require Congressional action. In line with formal and informal recommendations made to agency heads and personnel, at least 50 identifiable administrative actions have already been taken. A legislative drafting service, set up by the Commission, has suggested drafts of more than 40 bills covering many of the recommendations that need legislative action. Although the establishment of the legislative drafting service was provided for in the Act, the report explains that the Commission has not "considered, approved or adopted" any draft legislation in connection with its reports "nor can any such drafts be considered an official interpretation or specification of what the Commission meant" in its recommendations.

The Hoover Commission has done a job that sorely needed doing. Except for the transmittal of some remaining task force reports, the work of the Commission is finished. It now remains for Congress and the executive branch to put into effect—so far as is practical—the recommendations not yet acted upon. All the world will be watching with interest, especially those who prophesied that the Democracies will spend themselves into bankruptcy and ruin.

A direct descendent of the McKinlay entry driver, the first Marietta Miner was placed in service at Orient No. 3 in 1950

A Complete Continuous Mining System

Detailed Planning and Careful Development Allow Coal Company to Successfully Extract Pillars With Continuous Mining Machines in Illinois Coal Seam

By F. EARLE SNARR

Vice-President
Freeman Coal Mining Corp.

MAY 1955 rounded out four years of full-seam retreat mining in the Illinois No. 6 Seam using only Continuous Miners at Orient Mine No. 3, Freeman Coal Mining Corp., Waltonville, Ill. The experience with two McKinlay boring-type entry drivers at Orient Mine No. 2 from 1927, set the stage for the planning of Orient Mine No. 3 as a continuous miner operation at the outset in 1947. The wisdom of such planning, both as to choice of equipment and as to pillaring procedure followed, has proved to be both right and rewarding. So much so with respect to caving control, that there has never been a shot fired against the roof in the life of this mining operation.

Requirements To Be Met

In planning Orient No. 3 as a continuous miner operation, two requirements had to be satisfied; (1) The McKinlay entry driver had to be revamped for off-track mobility and shortened to permit the driving of short radius turns and near right-angle crosscuts; (2) The feasibility of full-seam retreat mining beneath 800 ft of cover (which also includes the extraction of the coal pillars usually left as permanent roof support), new in Illinois, had to be proved.

Marietta Miner Developed

The McKinlay entry driver was successfully redesigned and built during a two-year program promoted by the coal company. The newly designed machine emerged as the Marietta Miner in August 1950. All of the desirable features of the McKinlay machine were retained in the design of the Marietta Miner, and other features such as a crawler-type drive and provisions for retracting the cutting arms and lowering the top-cutting chain were added. The first Marietta was placed in underground development work at Orient No. 3 in September 1950; since then, a total of 11 have been placed in operation at this property.

Credit is due the two McKinlay entry drivers which drove 73 percent of the 2850 ft long twin slopes at Orient No. 3.* Both machines continued to develop headings underground until a number of the Marietta Miners were available.

Decide to Extract Pillars

It was thought that high productivity could be expected from the continuous miners provided complete extraction of pillars could be assured.

*See "Slope Driving with a Continuous Machine," by H. A. Treadwell, MINING CONGRESS JOURNAL, May 1951, Page 22.

Removing all pillars while mining the Illinois No. 6 Seam was a new idea. It had never been achieved before. However, a reliable yardstick was needed to evaluate the degree of risk involved. The guide used in arriving at a satisfactory decision was a study of reports about the nearest workings of an adjacent mine—three miles to the East. Based on the reports of seam conditions and roof behavior at this neighboring mine, and knowing there would not be shooting to start cracks in the coal ribs or disturb the overlying roof shales in the proposed workings, it was decided that the taking of pillars should prove entirely feasible and was not too risky a move to make. Furthermore, the characteristic curved ribs of the Marietta mined entries and narrow span of flat roof, favorable to locations with tender roof, plus the availability of recognized methods of mechanical roof bolting were other features which could be counted on to insure the further success of the pillaring operation.

Front view of the Marietta Miner. Note the cutting chains which take out the coal missed by the rotary cutters

The Mining Plan

After completing the bottom layout consisting of connecting the slopes with the shaft housing the automatic man cage and the surge bin area, three main entries were driven a mile west to the location of the upcast fan shaft and the seven ft diameter Axivane exhaust fan. As this work progressed, three heading panel entries were turned south on 680-ft centers and driven 2500 ft. This 1 by ½-mile block became the first territory available for full scale production. The return airways at the south limit of the block were driven east and west from the ends of the panel entries, and bleeder entries were driven midway between panel entries to permit positive ventilation against the fracture lines during retreat operations. Main entries are protected by 300 ft wide barriers.

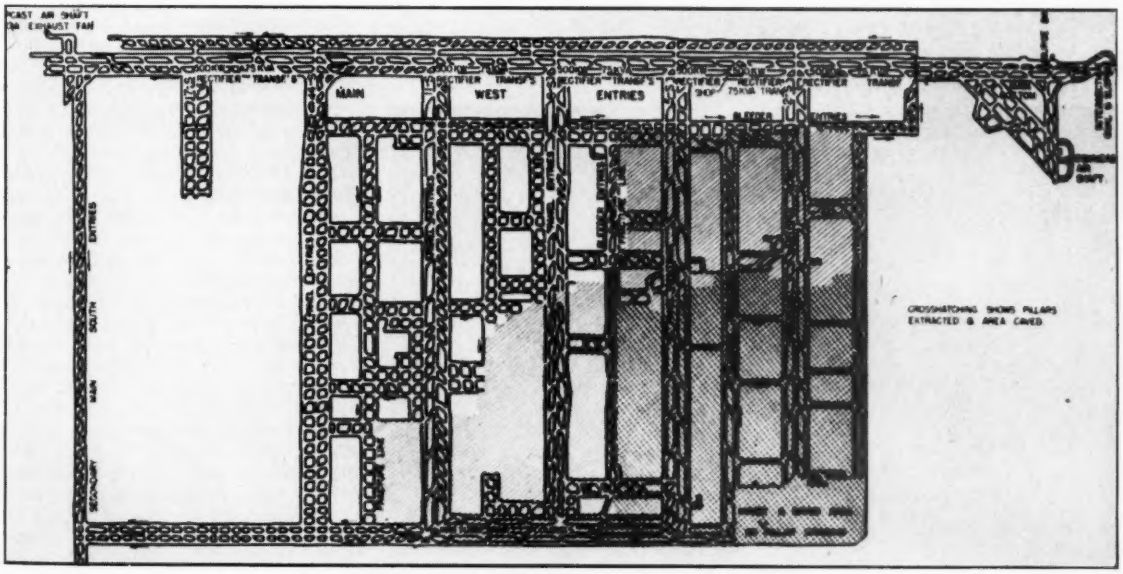
To date, both 1 by ½-mile blocks south and north of the Main West entries have been mined. At present most of the activity is centered in the second mile square area in the west where two panel territories have been retreated and also in another territory one mile south where a new cross entry is being developed.

System's Equipment

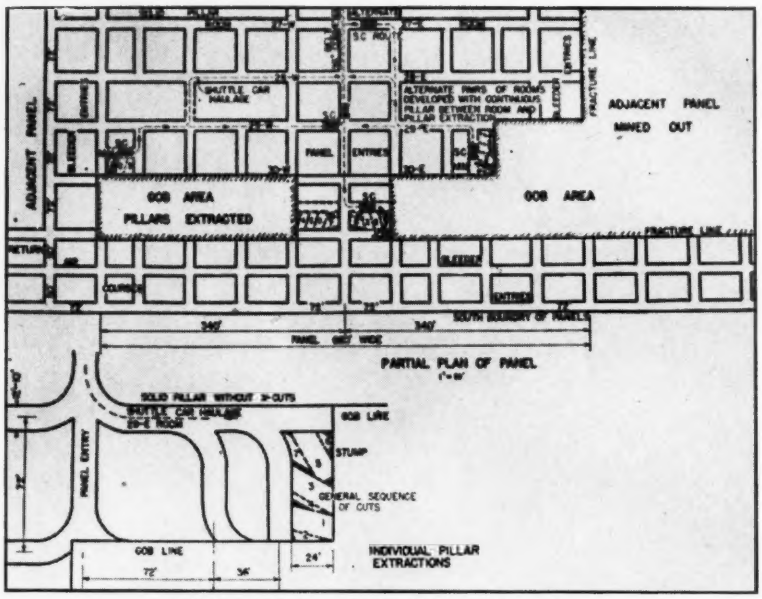
Each panel entry territory has two Marietta and one Joy JCM miners retreating along the fracture line. Two Joy shuttle cars haul from a miner and discharge on a 36-in., 425-fpm panel belt. This belt carries the coal to the 48-in., 550-fpm mainline belt which discharges on a shuttle belt over the 450-ton surge bin near the slopes.

The shuttle belt's discharge position is changed by the surge bin operator to take full advantage of the bin's capacity. At this same level, drop bottom mine cars may be dumped in one side of the bin. The coal is moved from the surge bin to the slope belt in the following manner: A bin apron feeder powered by a-c to d-c variable speed drive, remotely controlled from the preparation plant 3000 ft away, regulates the feed from the surge bin to a short belt. This belt discharges the coal underneath a large magnet and onto a motorized grizzly, pitching 20° downward.

The minus six-in. coal passing through the grizzly is used to bed down the slope belt. The plus six-in. coal passing over the grizzly falls into



Mine map showing block where pillaring began



Pillaring methods with Marietta and Joy miners

a single roll crusher and then it is deposited on the finer coal already on the slope belt. Coal loaded on the belt in the above manner is discharged at the surface cleaning plant 5-¼ minutes later. This 42-in., 625-fpm, 1200-tph steel cored belt installed on a 16°, 3300-ft long slope is the longest single flight lift conveyor (868 ft) in the industry.

Electrical Distribution

Before elaborating on the pillaring operations in a typical panel territory, a brief description of Orient No. 3's electrical distribution system is in order. The 69,000-v a-c power is stepped down to 4160 v, and distributed underground in 8000-v shielded cable suspended from a messenger wire along the roof. The extra insulation will permit changing to a 7200-v system if it is deemed desirable in the future.

At the main transformer station, a 46-ohm resistor in the neutral, limits the ground fault current to 50 amp. This protects a workman who might be standing on the ground and touching the frame of a rectifier or transformer at the moment the insulation failure occurs, limiting the voltage to about 100 v.

The 500-kw, 275-v d-c sealed tube Ignitron rectifiers are located at the mouth of each ½ mile long panel territory. About 9000 ft of 1,000,000 C.M. feeder cable is required for a fully developed panel territory. The feeders are doubled on both the positive and negative for the first 2000 ft and single the last 500 ft. Ample copper and substation capacity are essential to a system handling continuous miners. Peak loads should not disturb the system and outages are excusable only when fault currents are involved.

The mainline 48-in. conveyors are powered by 150 and 50-hp, 900-rpm, 440-v wound rotor motors in tandem and the 36-in. panel conveyors are powered by 60-hp, 1200-rpm, 440-v wound rotor motors. The starters for these motors have extra accelerating steps controlled by motorized timbers, to permit the belt motors to accelerate slowly. This feature minimizes belt stresses and take-up travel troubles. There have been times in this operation when a 36-in. panel belt carried coal from as many as five continuous miners. With the conveyor thus loaded to maximum capacity it has been possible to stop and start these conveyors at random without difficulty.

Cutting Pattern

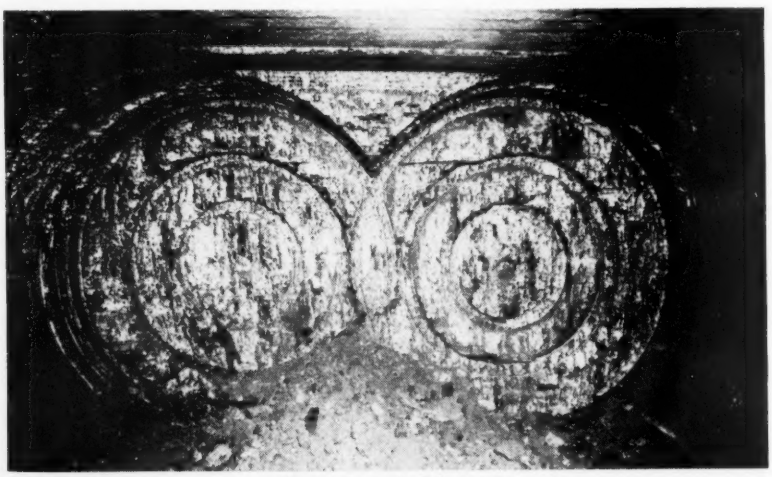
The Marietta Miner has two seven-ft diameter rotor arms rotating in the same vertical plane and spaced horizontally on 5-ft 10-in. centers. They rotate in opposite directions and 90° out of time phase. Both rotor arms rotate to the outside at the top. At the bottom the arms push the dislodged coal to the center for loading into the conveyor. Thus the arms cut two intersecting circles in the face on a 5-ft 10-in. spacing.

The two V-shaped sections of coal at the top and bottom missed by the rotor arms are released by cutting chains traveling across the face in opposite directions. These chain kerfs are tangent to the tops and bottoms of the two circles.

Each seven-ft rotor arm has six toolholders and a center or pilot bit. The toolholder positions are referred to as follows: two outer, two intermediate and two inner. In all, there are 12 toolholders and two pilot bits on the two rotor arms. The pilot bits drill five in. diameter holes about six in. ahead of the cutting bits on the 12 toolholders.

Various bit patterns have been tried by welding cutter chain lugs to the toolholder posts. We now use a five-position bit lacing and cut a three-in. kerf. Beginning at one end of an arm and continuing across, the bit holders are arranged as follows: A three-bit outside toolholder, two-bit intermediate, three-bit inner; then the pilot bit, two-bit inner, three-bit intermediate and finally a two-bit outside toolholder. The arrangement is the same on the rotor arm, and all toolholders are equally spaced. When it is necessary in solid work, the core is broken off by two wedged-shaped disc rollers attached to each rotor arm and trailing the inner and intermediate toolholders. The speed of the rotor arms is 17 rpm.

Several types of ½ by 1-in. carbide-tipped bits have been used. The more rugged or heavier headed carbide bits



View of a typical face cut

are used in extremely hard cutting. Bits are resharpened by an outside supplier and on the average each bit is resharpened three times. Bit cost for 1,600,000 tons of coal produced in 1954 amounted to 3.3 cents per ton. This includes the cost of resharpening.

Motor Performance

The Marietta Miner has a 70-hp motor that drives the rotor arms and a 25-hp motor which powers the three hydraulic systems for operating the conveyor, tramming the miner and operating the leveling and trim jacks. The 70-hp motor, the largest permissible motor available in 1950, has performed well in the field. To date, only one armature has required rewinding. Water jacketing the motor case, enlarging the brush shunts, increasing the brush pressure and reconnecting the bottom shunt field to provide minimum voltage to ground have enabled this motor to meet the full load demand of the miner.

Thyrite arresters connected across the motor fields; providing three steps of starting resistance for the large motor and two steps from the 25-hp motor, plus the use of definite time acceleration are a few of the special control features provided on this machine.

How a Panel Is Developed and Pillared

The Illinois No. 6 Seam varies from 7 to 11 ft in thickness at this property. Since the Mariettas are equipped with seven-ft arms, one foot of bottom coal and a foot of top coal are left wherever possible. The 12 in. of bottom coal left to protect the buggy roads during development are mined with a Marietta Miner during the pillar recovery operation. Top coal left serves to protect the weak overlying shales from disintergrating by exposure.

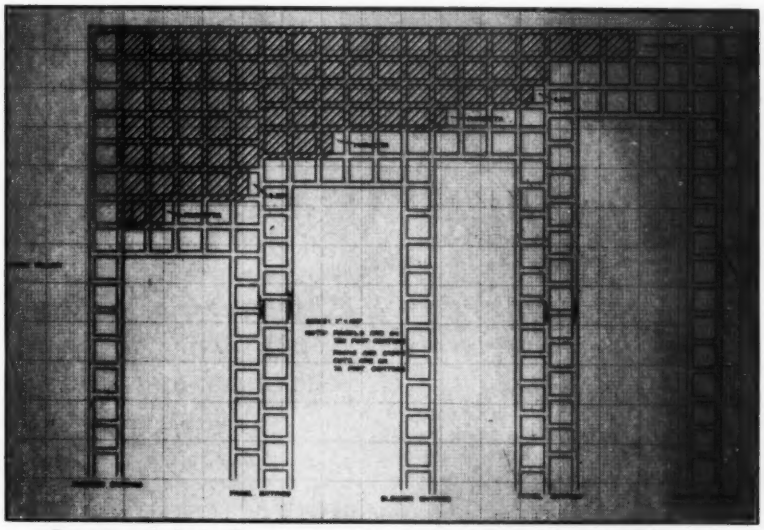
The mine is being developed to permit the mining of one mile square areas split in half by five-entry mains. The areas on either side of the mains are mined and caved from three entry panels, one-half mile long and 680 ft wide. Mariettas drive the panel entries on 72-ft centers and 90° crosscuts on 72-ft centers. Inby the 300-ft barrier pillar, No. 1 and No. 2 rooms are driven both right and left for bleeders. Beyond No. 2 room the crosscuts in the panel entries are staggered. The 36-in. belt conveyor is located in the center entry. Another entry is used for track haulage to move supplies to the face. The d-c feeder cables are installed in the third entry.

The three panel entries are driven to the panel boundary where two bleeder entries on 72-ft centers are driven right and left to form the chain pillars (consisting of a row of 60 by 60-ft blocks) which are always left to insure adequate ventilation of the gobbed territory. These chain pillars are later extracted from panels driven from the opposite direction.

In advance of the pillaring operation at the top end of the panel, two or more rooms are driven on 72-ft centers by Mariettas on each side of the panel entries. Room crosscuts are also made at 72-ft intervals. Thus, 60 by 60-ft blocks are formed across the panel for pillaring.

The first attempt at pillaring used a flat fracture line with Marietta Miners recovering the room blocks on either side and a Joy Miner recovering the panel entry chain pillars. This method did not work satisfactorily because the center blocks formed a point and the pressure became excessive.

Now the pillar line is operated with three 72-ft steps, each machine working on a separate step. The blocks are robbed by splitting at the midpoint and attacking from either the room entry or crosscut side, mining the ribs from either side of the split. Where crosscuts are caved the blocks



Present method of pillar recovery using a step fracture line with 72-ft steps

ars split from the room side and the ribs are pulled right and left. Rooms turned towards the adjacent mined-out panel are driven slightly in advance of those driven towards the solid coal.

The Marietta takes up bottoms in all rooms, room crosscuts and splits driven through the blocks. Bottoms are never taken in the seven lifts or passes required to mine the 24-ft thick ribs on either side of the split. Only small fenders or stumps are left and these crush out without shooting. Upwards of 90 percent of the seven-ft cut is recovered.

Initial falls occur when about 60 blocks, or six rooms have been mined. Since the pillared area is generally within one or two rooms of a large solid block of coal and since each room is pillared shortly after it is developed, roof problems are of short duration. While pillaring was an entirely new operation for the men at this mine, almost 5,000,000 tons of coal have been extracted without a serious accident from falls of roof.

The Joy Miner, because of its mobility, teams up well with the Mariettas on a panel fracture line. Usually the Joy occupies the center step in the panel. Power requirements of the continuous miners are minimized by reason of the constant weight on the fracture line pillars, which assists in breaking the coal.

Summary

To summarize briefly the highlights of this paper, the operation described was planned in advance to utilize the continuous miner type face equipment and the equipment was designed to meet the geological conditions existant at this location. The methods and machines adopted are meeting these conditions with better success than previously achieved by conventional methods and equipment.

Use of the continuous miner must be credited to some degree for discarding of the long standing philosophy that extraction of pillars in Southern Illinois by the retreat fracture line methods was impossible. The rapid removal of one pillar at a time by use of the continuous miner rather than the slower mining of several pillars with conventional loading machine methods affords better roof control and contributes to more clean-cut breaks at the fracture line with less danger of rides or squeezes.

In reviewing the four-year pillar mining operations at Orient Mine No. 3, it seems fair to conclude that decisions reached in the pre-development planning stages of this mine have proven basically sound.

Originally a 2500 tpd block caving operation, Bagdad now produces more than 1,000,000 tons of ore per year

The Bagdad Open Pit Conveyor

Accomplish Change Smoothly from Underground Block Caving to Open Pit Operation With Conveyor Haulage—and Almost Double Production in Process

By GEORGE W. COLVILLE
Chief Engineer & Assistant General Manager
Bagdad Copper Corp.

BAGDAD Copper Corp. operates a medium sized open pit mine and concentration plant presently handling 3500 tpd of quartz porphyry ore. It is located about 40 air miles west of Prescott, Ariz., at an altitude of 3300 ft.

Originally the ore was mined underground by a block caving method, and the mill was designed for 2500-tpd operation. Ball mills, being hungry monsters, were difficult to keep fed from the underground mining. This, along with high mining costs, precipitated a review of the entire operation and it was decided to change to an open pit in 1945. The favorable waste-to-ore ratio, together with improved rock moving equipment, made this change feasible and an immediate start was made.

The transition from underground to open pit mining was gradual and no shut-down was necessary. It was accomplished in the following manner:

An area on the surface above the underground workings was selected where overburden proved to be thinnest. At that time, a contract was let for stripping the area, Bagdad then having no equipment of its own. Simultaneously, a raise was started in the underground workings below the area.

After the raise reached the surface, it was used as a glory hole; the ore at the top having been stripped of waste, was blasted and bulldozed directly into the glory hole, drawn into cars on the underground haulage level and trammed to the shaft pocket. A second contract was let for more surface stripping and mining as the pit increased in size and more raises were driven until eventually there were four glory holes. The last one made use of an old shaft on the property.

During this time, the proportion of ore mined by block caving diminished and ore from the glory holes increased until all of the ore was being produced from the open pit and being transported by the underground haulage system. Meanwhile, the company had terminated stripping and mining contracts and secured equipment of its own.

This new system worked fairly well. It furnished the mill with the necessary tonnage and reduced mining costs substantially. However, there were still disadvantages. It was necessary to operate three shifts underground. Glory holes clogged and underground maintenance was quite an item of expense.

Need for a means of surface transportation of the ore to the crushing plant presented a real challenge. Haulage by trucks was the first considered as a solution but the pit and the crushing plant were so close it made grades prohibitive, especially on a long range program, where pit depth would increase as the operation continued.

A conveyor system from pit to crushing plant was considered next. Use of such a system made it necessary to crush pit-run ore to a smaller

size, one that could be economically handled by a conveyor. Surveys were made and a site selected for a crusher in the bottom of the pit. This location was abandoned, however, as it would entail the installation of two conveyors and a transfer point, and no room for crushed ore storage. A second spot was selected at the edge of the orebody where a minimum of ore would be tied up. Some uphill ore haulage would be required but not to an objectionable extent, and there was the added advantage that a single primary conveyor could be installed by using a short conveyor from the crusher to a storage pocket. This layout seemed sound enough and it was definitely decided to make the installation. This was in early 1947.

Equipment was ordered, consisting of 36-in. conveyors, a 5 by 12-ft scalping screen, 36-in. pan feeder and 42 by 40-in. jaw crusher. This size crusher was selected because it could handle pit-run size ore and still have sufficient capacity, tonnage wise.

After the necessary surveys were made tying the underground workings to the existing crushing plant, it was determined that the tail pulley for the new belt would be 40 ft above the underground haulage level. A raise was driven to this point and a sizable room mined out. Next, an inclined raise on a slope of plus 17½° was driven to the surface toward the crushing plant. This procedure allowed the use of the underground haulage system to dispose of the material. Another raise was driven vertically to the surface. This vertical raise was the beginning of the crushed ore storage pocket.

At the same time, foundations were poured for the crusher and scalping screen at a distance of about 120 ft from the vertical raise. The inclined raise which was to house the conveyor was timbered to its intersection with the surface, a distance of some 100 ft.

Main conveyor emerges from ground and carries ore up 17½° slope to secondary crushers

From this point, it was necessary to enclose the conveyor in concrete and corrugated pipe as far as the edge of the pit. This was required because of the need to backfill over the conveyor to construct haulage roads. The deeper end is made of concrete and the shallower of corrugated pipe.

From the end of the pipe to the crushing plant, a timber structure was erected. Timber was selected because there was plenty at hand in the mine timber yard and it would not be needed underground, after the conveyor was in operation.

The room at the tail pulley end of the conveyor was concreted and provision made to install the pan feeder. The vertical raise starting from the pan feeder location was enlarged on a taper to form an inverted cone which made the crushed ore storage pocket. A steel structure was erected at the discharge end of the conveyor to house the head pulley drive and take-up.

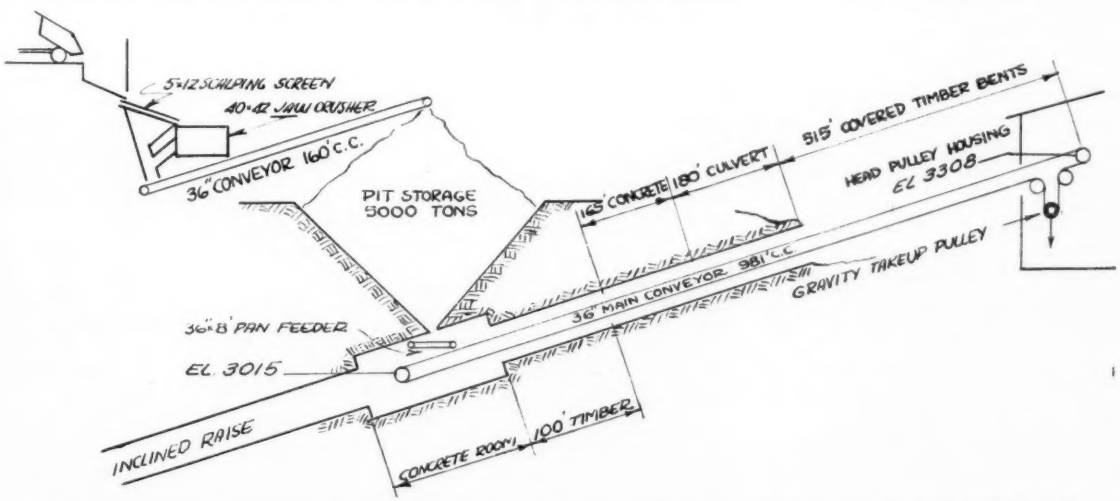
Meanwhile, the crusher was installed together with the scalping screen, truck hopper and cross conveyor to the ore pocket. Next the pan feeder was installed and finally the main conveyor equipment and belt.

By early January, 1948, the wheels were ready to turn. Except for a few minor bugs, no special difficulties were encountered. After a short time the entire ore production was being handled by the conveyor and has been ever since except for shutdowns for maintenance and repairs.

Operation of this conveyor calls for one operator at the pan feeder where the ore is transferred from the storage pocket to the belt. Another is employed at the primary crusher and is responsible for running the scalping screen, crusher and cross conveyor to the ore pocket.

In essence, the flow of the ore from

(Continued on page 48)



Pit conveyor system increased ore storage capacity, lowered transportation costs, helped increase mine and mill output

Auger Mining in West Virginia

A view of the auger from the discharge side

Bitner Fuel Uses 48-in. Auger to Mine 700 Tons of Coal Per Shift

By GEORGE W. SALL

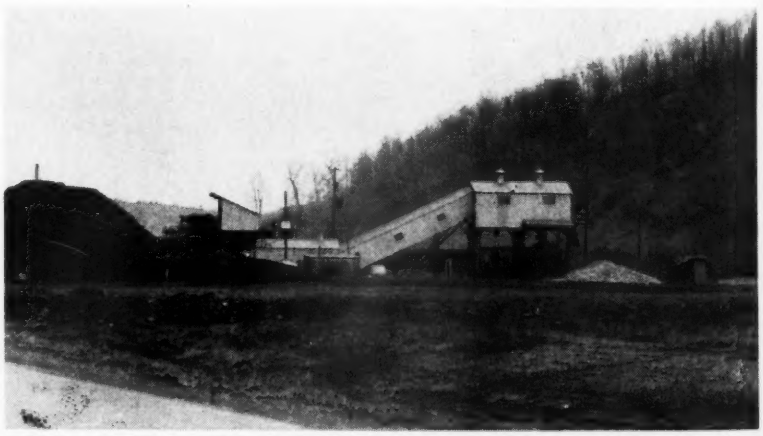
IN recent years strip mine operators have been given a new tool in the never-ending fight for more coal at lower costs. At first this tool, the coal auger, was considered merely an adjunct to other stripping operations—an adjunct which permitted the strip operator to mine coal from fringe areas that would otherwise be left unmined. Now, however, augering has developed to the point where many coal operators gear their entire stripping operation to the auger. There is no denying that auger mining is rapidly coming of age.

Working in Pittsburgh Seam

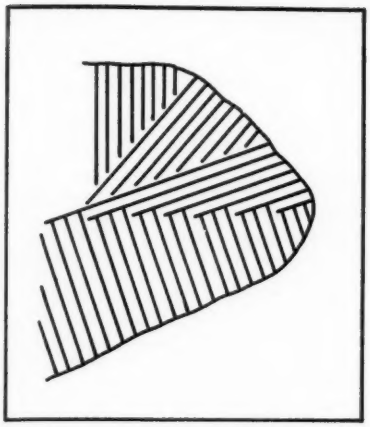
One company that has taken full advantage of the coal auger is the Bitner Fuel Co., which operates strip mines in the area around Jacksons Mill, W. Va., about 30 miles south of Clarksburg. The company has on its property about 40 miles of Pittsburgh coal outcrop and 25 miles of Redstone outcrop. Between 26 and 28 miles of the Pittsburgh outcrop has been stripped; the rest is untouched.

Both coal seams are found only in the tops of the hills which dot the countryside. Present mining is in the Pittsburgh seam only. In time the Redstone will be stripped or augered wherever possible, but the presence of a great many clay veins make it uneconomical to mine in several areas.

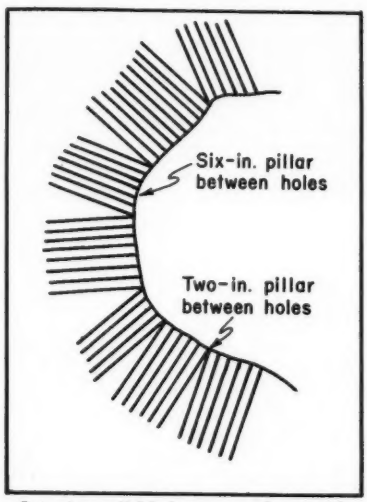
The seam now being mined, the Pittsburgh, runs a consistent 54 to 56 in. thick over the property. In the stripping operation overburden is being moved by a 1201 Lima, high-front shovel having a 2½-cu yd bucket. A Galion Grader follows the stripping shovel to clean the coal seam off and a ¼-cu yd Lorain shovel is used to load coal. The grader is also valuable for maintaining roads, an operation too often slighted by strip mine operators. As a general rule the terrain is such that two cuts can be made before the overburden becomes too heavy for economical handling by present stripping equipment. The average highwall left is between 50 and 55 ft high.



Coal is hauled three miles by truck to a tipple on the Baltimore & Ohio Railroad



Blocking on outside turns allows for maximum extraction



Sets of parallel holes are used on inside turns

Preparing the Bench

To be prepared for augering, the pit must be at least 50 ft wide since Bitner Fuel is using a Compton Model 48 auger which has a length of 48 ft. To allow trucks to bypass this machine in working position the bench has to be a minimum of 60 ft wide.

Another step in preparing the pit for augering is to take up about six in. of the clay underlying the coal seam. This is bulldozed away and allows more freedom in lining up the auger with the coal seam.

Although the coal is only 54 in. thick, Bitner is using a 48-in. diameter auger. According to accepted practice this is too large—they should only be using a 42-in. auger—and they should pay the penalty in short holes. The coal company calculates, however, that if it can maintain a drill hole depth of 125 ft with the larger auger, more coal and a better rate of recovery can be had from the property than if a 42-in. auger was used. Over the past year hole depth averaged 178 ft, well over the economic cutoff point.

Although the Redstone seam is thick with clay veins, they are relatively few and far between in the Pittsburgh coal on the property. When encountered they are drilled through with the auger. As soon as this material starts feeding out of the hole though, it is loaded out separately and dumped on the ground at the tipple. Any lump coal is picked out for house coal.

Positioning Auger

When lining up for operation, the auger is set to enter the coal about three in. off the bottom. This leaves from three to five in. of coal at the top of the seam. Assuming a level coal seam, the auger is also angled up about two degrees. If the seam dips or rises, a compensation is made to keep the same two-degree difference between the plane of the auger and the plane of the coal. A spirit level, calibrated in degrees, is used to line up the bed of the machine. The calibrations on the level make this job easier.

Whenever possible drilling is on the butt cleat or at least on ¼ butts. This is done for two reasons: first the coal cuts easier on the butt than on the face cleat; second more lump coal is produced when drilled on the butt.

The deepest holes being drilled are 208 ft. This depth hole takes, in addition to the 8-ft cutting head, eight 25-ft augers—all that can be racked on the machine. Average drilling time, from the time the hole is started until the hole is completed and all augers are retracted and racked, is in the range of 45-50 minutes—that is for a full hole. It takes four to five minutes to move the auger to the next set up and seven to eight minutes to level up the auger for drilling.

Making Turns

Turns are the bane of any auger operation, and with the coal seam lying in the tops of hills deeply cut with ravines, Bitner Fuel has its full share of turns. The problem, of course, is to get as much coal as possible without having to drill short holes to get it. Bittner meets this problem by a process it calls "blocking the turns." As the auger comes into an outside turn, the holes are shortened an auger length at a time, but kept parallel. When the last hole is drilled (it will only be one auger length in depth) the machine is slewed so that the next full length hole is drilled parallel to the ends of the shortened holes. Hole depths are again shortened one auger at a time for the next several holes. This can be continued on around the turn if desired or the auger can be positioned so that subsequent holes drill into the freshly drilled areas. The shape of the turn and its size will dictate how the turn is completed.

On inside turns holes are augered in parallel sets. The number of sets and the number of holes in a set are also determined by the size and shape of the turn. When a change in direction of the auger is made from one set to the next, the pillar is narrowed down to two in. at the face.

Winch Auger Into Position

All moves are scaled to an accuracy of one in. A steel pin is driven into the ground by the pontoons on the side of the machine away from the direc-

An end-on view of the auger at the completion of its work at one pit. From this location, the auger was trucked to a newly opened pit 1½ miles away

tion of travel. The advance is measured from this point. It is during this time that the newly augered hole is inspected by the auger foreman in readiness for the next set-up.

When moving from a completed hole to a new set-up, the auger is winched ahead instead of being towed. The coal company bought a second-hand D-8 tractor at a considerable saving and equipped it with a Hyster winch. Although the tracks on the D-8 are worn, it has enough traction to stay in position on most of the moves. If the pull gets extra hard, the operator merely spins one track at a time (he can do this because he is pulling against the winch cable) and digs the D-8 down. In this position it acts as a giant deadman and is well anchored against any pull it can exert on the 45-ton auger.

The winch also comes in handy for recovering lost augers. This is not often necessary. When it is, the auger has usually been lost because of a broken coupling pin, not because it was caught in a squeeze.

Crew Size

A five-man crew operates the auger. The importance of selecting the crew cannot be overemphasized. To a large degree it is their ability to work together as a team, and their willingness, that determines production. Bitner Fuel has found it advantageous to hire young men without coal mining experience as crew members. Only the foreman has had deep mine experience. In addition, there is a general superintendent of augering who has charge of planning and reclamation in addition to overseeing the auger operation.

BITNER FUEL COMPANY

AUGER MINING REPORT

MINE Millstone

MOTORMAN ____ HRS. ____ DRILL ____ DATE ____

HYDRAULIC OPERATOR ____ HRS. ____ SURFACE OWNER ____ SHIFT ____

HELPER ____ HRS. ____ COAL OWNER ____ AUGER No. ____

HELPER ____ HRS. ____

TRACTOR OPERATOR ____ HRS. ____ REPORT No. ____

No. HOLES	DRILLING TIME	DEPTH OF HOLE	TIME DELAYED	SUPPLIES FUEL	SUPPLIES OIL	SUPPLIES GREASE	SUPPLY NEW BITS OLD BITS	REASON AND REMARKS
1-6	50	156'	Changing time on bits - 10 mins.					Old Mine
2-6½	50	169'						Old Mine
3-8	70	210'	Wait on trucks - 25 mins.					
4-8	70	210'						
5-6	50	156'						Hit Bottom
6-8	70	210'						
7-8	70	210'						
8-8	65	210'						
9-8	70	210'						

OTHER REMARKS

Records are kept of drilling time and delays for later study and analysis

The five-man crew averaged 700 tons' production per eight-hr shift from June 30, 1954, to December 1, 1954. Their best day's output was 1050 tons in a nine-hr shift—a lot of coal from one machine.

Careful and complete records are kept of the operation. This includes listing the number of augers used in each hole, the depth of hole, drilling time, an explanation of delays and the reasons for short holes.

Haulage

Bitner Fuel has contracted its coal hauling on a tonnage basis. Because haulage road conditions are extremely important, the company will only allow tandem trucks to work for them. These trucks, with their greater tire area to carry the load, are not so apt to tear up the haulage roads during wet weather. The company also likes to have trucks on the job that will hold an auger's length of coal—13.4 tons. When this is the case, truck changes can be made at the same time that auger sections are added, and losses in production time are kept to a minimum.

To further cut delays, the company has designed a chute, for installation at the discharge point on the auger conveyor, which can feed coal to the left or right. Operated hydraulically, it will allow two trucks to be in loading position at one time. This will eliminate the three to four-minute truck change time and mean a considerable increase in production time over a long period, assuming, of course, that there are always trucks available.

Realizing that the mined coal is not worth anything until it reaches a market, company management has placed emphasis on good haulage roads. This emphasis has paid off. They have worked when other strip mines in the area haven't because trucks couldn't get in or out of the pit. Drainage is the big problem, and the roads are kept well ditched. A grader is used to keep travelways free of big holes and well crowned. Access roads are surfaced with limestone, where needed, into the pit. Haulage is certainly a most critical part of an augering operation and its importance should not be slighted by poor engineering or lack of maintenance.

48-inch holes and 6-inch pillars in the Pittsburgh seam

Maintenance

Equipment maintenance is handled by two mechanics. All equipment, including reclamation equipment, is greased at the end of every operating shift. Repairs are made, when possible, on the off shift, or when a particular machine can be taken away from its job. In addition to the mechanics, a welder is used for roustabout work. One of his duties is to hardface the outside scroll of the cut-

ting head and the inside breaker. This is a more important step than might be first considered. The cutting heads, of course, are cylindrical in shape and protected by a scroll which furnishes the riding surface as the coal is drilled. It is almost impossible to make the cutting head perfectly cylindrical in the shop. Through use, though, the head is gradually worn down to a true cylinder. A close check has to be kept on the wear of the head during this break in period. If the protecting scroll should wear thin enough to allow the shell of the cutting head to rub against the coal, the head would soon be worn through. By building the scroll up for its entire length with an even bead of hard weld when it shows wear, the cutting head shell maintains the protection of the scroll.

Bit Changes

Kennametal tungsten carbide cutting bits are used. Bits on the auger are inspected after every hole and any damaged ones are replaced. During the first week in March, 1500 tons of coal were augered at one stretch without one bit having to be replaced. Bits are reconditioned after use by a commercial bit grinding service.

Bitner Fuel has replaced the No. 8 cutting bit recommended by the auger manufacturer with a No. 7 bit. The gauge of a No. 8 bit is 1½ in. and the gauge of a No. 7 is 1¾ in. They, therefore, are getting a hole ½ in. larger in diameter, giving greater clearance for the cutting head and the augers. The larger hole has one disadvantage, it will wander more. This has not, however, appreciably affected operation of the auger. When real hard coal is encountered, the No. 7 bits are replaced with No. 8's.

In addition, the coal company is grinding the shoulder of the bits down to the place that the clearance angle is increased from 7° to 15°. While this does not leave as much metal to protect the carbide tip, it does reduce the drag and the company has experienced a 150-200 psi reduction in drilling pressure. Usual drilling pressure is now 1200-1500 psi.

Land Rehabilitation

West Virginia law requires that strip mine operators back fill to the top of the coal. Two D-8 bulldozers are kept on this work steadily by the company which goes beyond just backfilling. Displaced overburden is graded to the point where farm machinery can travel it. As backfilling is completed, the land is turned over to a farm subsidiary of the company which seeds the new land in clover or plants Black Locust. The farm subsidiary also manages stock farms on the coal properties bought up by the parent company.

The two coal seams lie in the tops of the hills which dot the countryside

Precious minutes can be saved if trucks are changed at the same time augers are

Two D-8's are kept busy backfilling and grading displaced overburden

Safety on Scraping Subs*

Careful Attention to Safe Design Plus Proper Training of Miners and Constant Supervision Essential to Safe Operation

By W. P. REED
Superintendent
Bristol Mine
Inland Steel Co.

SINCE the development of slushers and scrapers as a mining tool, methods of mining at the Bristol Mine have been adapted to this useful and flexible piece of equipment. From its first acceptance by the mining industry, the scraper methods of handling ore has been studied with the idea of improving its efficiency and with the object of eliminating the hazards incident to its use. The particular application with which this article is concerned is the use of scrapers in moving broken ore from stope mills to the grizzly.

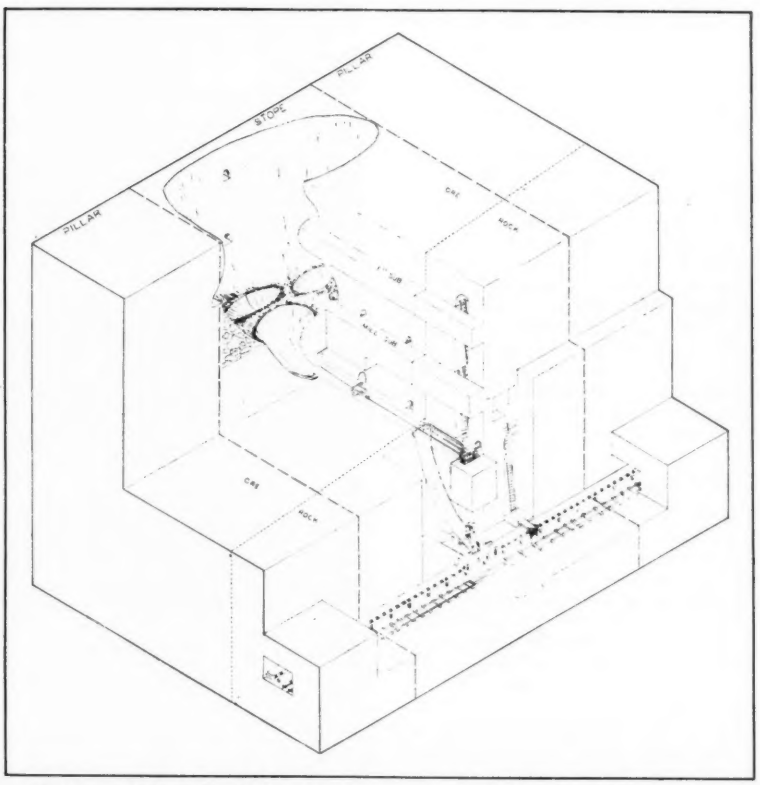
Much has been written on the layout and operation of various mining methods in which the scraper is used as one of the prime movers. Due consideration has been given to the task of eliminating the hazards which became apparent as these methods of mining have developed. Here attention will be focused on operations on the scraping sub alone and a few of the more common hazards involved.

One of the most common causes of accidents on the scraping sub, or transfer drift, is poor design of the mills or drawpoints through which the ore passes from the stope to the floor of the scraping sub. The reference here is to open mills, which are used extensively in the semi-hard ores usually mined by the sub-level stoping method. These mills are funnel-shaped openings in the bottom of the stopes. Broken ore drops through them and flows through short, inclined raises, into the side of the transfer drift. Proper dimensions of the mills depend on the size of the transfer drift, the vertical ditsance from floor to floor between the scraping sub and the mill sub, and the size of chunks to be drawn through the throat openings. In general, the brow of the throat opening should be low enough so that a full, free-running mill will not fill the transfer drift so full the scraper cannot pass over the dirt pile. In theory, the slope from the brow of the mill to the opposite side of the drift floor should approximate the angle of repose of the material being drawn. With such a relationship the flow of ore automatically stops before the drift can become even half full and cannot resume until part of the dirt pile has been removed by the scraper. This also allows some of the oversize chunks to be reduced, on the floor of the transfer drift, before being scraped to the grizzly.

Need Good Drawpoint Design

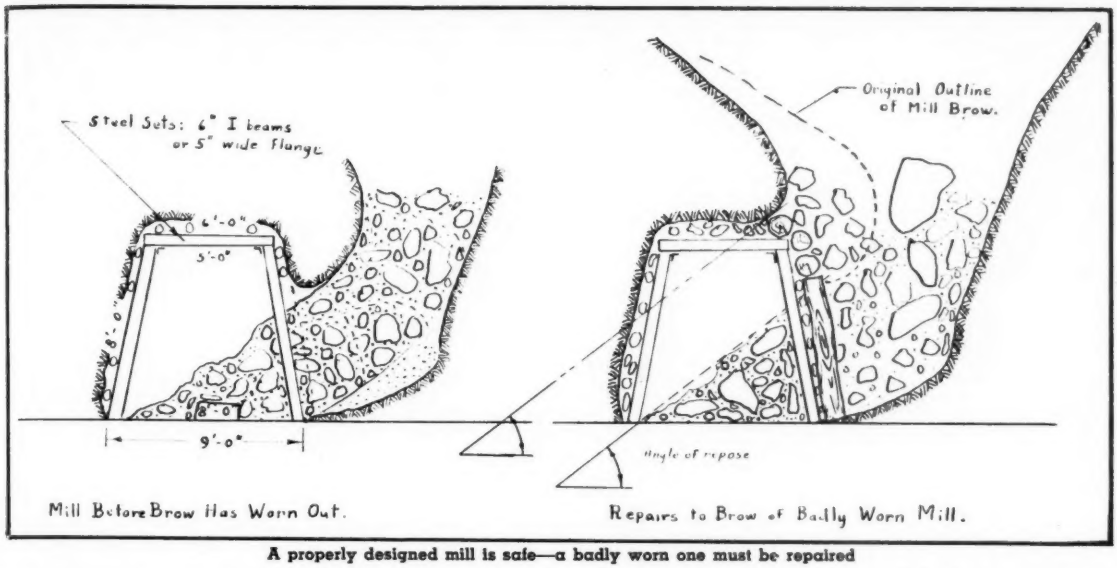
Since the height of the brow is critical, the mill openings must be cut out with extreme care to avoid overbreak. One method of controlling this is to make the initial opening in the form of a short, almost horizontal, dogdrift, with the floor at the same elevation as that of the transfer drift, and the brow and back kept low (not over five ft above the floor). From this opening, six to eight ft from the transfer drift, the mill raise is driven and then coned, or funnelled out, by uppers fanned out from the walls of the raise, to cut the desired shape and size opening. The brow and the back of the dogdrift opening can then be raised, to make a smooth, vertically curved opening from the mill to the transfer drift, by lightly charged slice holes, care being taken not to shatter the brow. The miner does not always realize the importance of this feature, and it sometimes requires close supervision to prevent him from starting a raise at or near the back of the transfer drift where all his muck will fall or roll out of the mill raises by gravity.

The coning or funnelling of the mill is also very important. Care must be taken to avoid cutting back too sharply over the back of the transfer drift, as the brow may be easily shattered and the back of the drift seriously weakened. The funnel shape of the mill should be such that fairly large chunks will not hang up too high in the mill to be reached by a drill machine or a blasting stick. In forming the mill, uppers from the walls of the mill raise are preferable to stope holes from the mill sub, since



Mining methods at the Bristol Mine have been adapted to the safe efficient use of scrapers

* Presented at Meeting of Lake Superior Mines Safety Council at Caspian, Michigan on April 7, 1955.



A properly designed mill is safe—a badly worn one must be repaired

the latter may leave a stepped effect, or a sharp bottle-necked section, which causes frequent hang-ups.

With proper design and construction, a mill in fairly solid ground will usually outlast its needed use, provided it is not abused. It can be quickly ruined, however, when blasting down hang-ups if large explosive charges are placed between a chunk and the brow of the mill. With the brow worn out, either by use or by blasting, a mill can be quite dangerous since the flow of muck cannot be controlled and the miner must be very careful to avoid chunks rolling out of the mill near the back of the drift.

When a mill is badly worn and its continued use is necessary, its brow and sides may be replaced by proper installation of timber or steel to reduce the throat opening. Such a repair job can be undertaken safely when the mill is hung-up with chunks of such size that they cannot drop through the mill on the repair crew. If this is not the case, the opening should be stopped temporarily by poles and timber wedged into the throat and blocked tightly against the muck before any repair work is attempted.

Mill Location Important

Location and spacing of the mills also have a bearing on the safety of the operation. Open mills placed directly opposite each other present a hazard to the man attempting to loosen a hang-up in either mill since he is thus forced to turn his back on the opposite mill and may have no warning of a sudden run. Some operators locate the scraping drift in respect to the mining block so that all the mills open out of one side of the drift. In such a layout the vertical height of the mill-sub above the scraping-sub must be such that the mills will have at least 15-ft pillars between and still, when funnelled out, cover the entire mining area to be drawn. With a low vertical height, closer spacing may be necessary, so it is fairly common practice to cut mills staggered on alternate sides of the drift, with the mills on either side spaced on about 30-ft centers.

Control Flow of Ore

Considerable thought has been given to possible methods of controlling the run of dirt from mills. These may involve the use of stopper boards or poles, supported by chute irons bolted to steel or timber legs, or the stoppers may be simply shoved in behind the legs of the drift sets in such a way that they span the mill opening. The conventional chute with stoppers has been found impractical as it is very likely to be struck by the scraper. These are effective safeguards against the possibility of chunks rolling suddenly out of a mill, but are costly to maintain if the mills are drawn empty and a successive blast in the stope drops the muck directly onto the stoppers. It is a rule in many mines that mills must never be drawn completely empty, but since this sometimes restricts the contract miner's production, it is not always followed. A fenced-off travelway past each mill has been tried with the idea of reducing the miner's exposure to runs from the mill. In some

Ore flow stops automatically when the angle of repose of the pile is reached

mines a small travelway or safety drift is driven, parallel to and about 20 ft from the transfer drift but connected to it at intervals by short crosscuts. By this means the miner can detour around all the mills for access to his headblock. However, it is still necessary at times for the man to pass in front of a mill in order to replace and rig a broken rope, so the safest policy is to keep the mills in such condition that runs cannot occur.

In softer ores, where the mills wear very rapidly, the entire transfer drift is sometimes lined with 12 in. of concrete, in a curbed or arched section, and the mill openings in the sides of the drift formed and poured to close dimension with up to an 18-in. concrete lining. This design has been found very successful, though expensive to construct except on a large scale. As an alternative, many mines use timber or steel sets of various designs, with the mill openings restricted in size by sturdy timber or steel framing and heavy head blocks to protect the brow of the mill openings.

Blast Hang-Ups Safely

Even with properly constructed mills in perfect condition, frequent blasting of hang-ups is necessary. Fine, packed material can usually be dislodged by a blow-pipe, but large chunks wedged tightly in the mills must be blasted down. When this is necessary the miners may expose themselves through inexperience or lack of judgment to great danger.

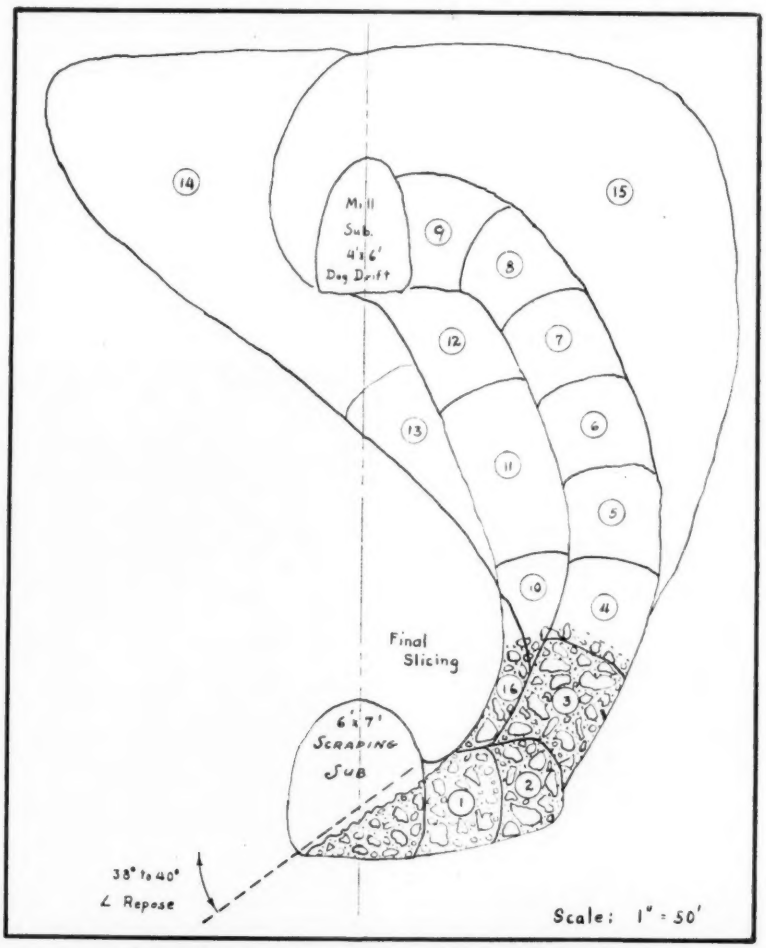
If the chunks are close enough to the throat opening, a good miner will blockhole them, saving considerable time and explosives. This also avoids damage to the brow or throat of the mill, which usually results when bombs are placed between the chunk and the solid ground. When the hang-up is too high to drill with a machine in the transfer drift, bombs of varying amounts of powder are tied to a long stick and placed where they will be most effective. Here the miners must be cautioned against using too much powder, to minimize smoke and concussion. Detonation is effected by cap and fuse—electric detonators are not ordinarily used because of stray-current hazards. The bombs are placed securely before the fuse is ignited. In case of high hang-ups this may require a 15 to 20-ft length of fuse, which causes a considerable unproductive delay before detonation. This can be minimized by detonating the charge with a length of Primacord, fired by a four-ft fuse and cap, accessible from the drift. Another trick is to detonate the bomb by a four-ft fuse-and-cap primer, fired by a pull-wire lighter actuated by a length of string hanging down to the transfer drift. Pull-wire lighters are relatively inexpensive but are not suitable for wet places. One objection to their use is the difficulty in fastening them securely to the fuse, although a few inches of friction tape does a fairly satisfactory job. This product could be improved by fabricating the tube from metal, which could be hand-crimped to the fuse in the same manner as a blasting cap.

Under no circumstances should a man climb up under a hang-up, though there are still alive a few daredevils who will persist in such suicidal measures. In my opinion, a man who places such a low value on himself should not expect the high esteem of his fellow man. No boss who is worthy of the name will allow a man to needlessly risk his life, even if the man is foolhardy enough to do it voluntarily. Neither should a boss set a bad example by needlessly risking his own life in the performance of a task which he would not allow one of his men to attempt. He must bear in mind the possibility that while he might occasionally take such risks and survive to retirement age, his example is likely to be frequently followed by any of his men, and sooner or later someone will be killed.

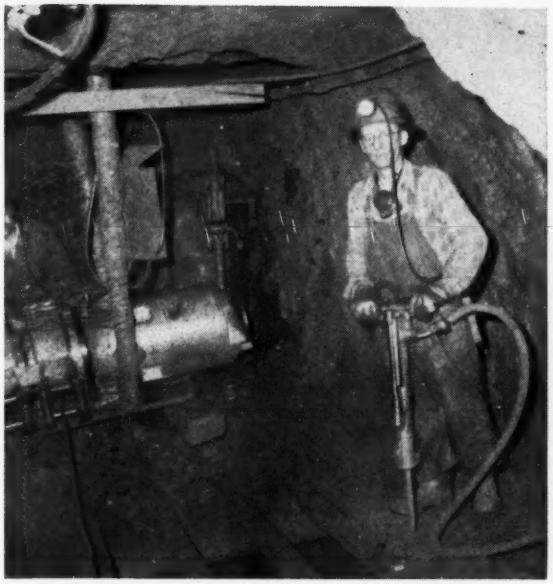
For block-holing chunks beyond the reach of a drill machine in the transfer drift, a very lightweight machine is now being tried, secured to a pole and shoved close enough to the chunk to drill a short hole in it. Charging the hole may take a bit of juggling. Perhaps a tubular charging tool can be devised to place and tamp the charge.

Danger on the Grizzly

The grizzly has its own inherent hazards, which are worthy of study. Most grizzlies are constructed of horizontal parallel steel rails, usually spaced with 10 to 12-in. openings, with the base of the rail up, securely fastened to heavy notched timbers or imbedded in concrete. The rails are laid lengthwise to the direction of scraping, and it is good practice to bend the forward end of the rails down so the scraper cannot hook them. Since the grizzlies offer scanty footing and are slippery as well, they provide a poor walkway, which has resulted in many a nasty fall. Room for a person



Mill openings must be cut out carefully to avoid overbreak



Planking provides safe footing for the grizzly-man

Safety screen protects operator from broken rope backlash

to walk around the grizzly is the real answer to this problem. If this is not feasible, planks should be thrown across when the scraper is not operating. The air and water piping, which is often hung from the back and within convenient reach, has saved many a slip from being an accident, but is not ordinarily hung with the idea of supporting the weight of a falling man. Perhaps a 1½ or 2-in. pipe, well supported by eye-pins from the back or side and within convenient reach, could be installed for use specifically as a hand rail.

Reduction of chunks on the grizzly also furnishes its share of accidents. Good footing is essential to a man swinging a sledge or operating a demolition tool. For this reason, a smart scraperman will do as much breaking as possible on the solid floor of the transfer drift. However, being smart, he also quickly learns that many chunks can be broken on the grizzly by the action of the scraper bail slapping the chunks on the rails.

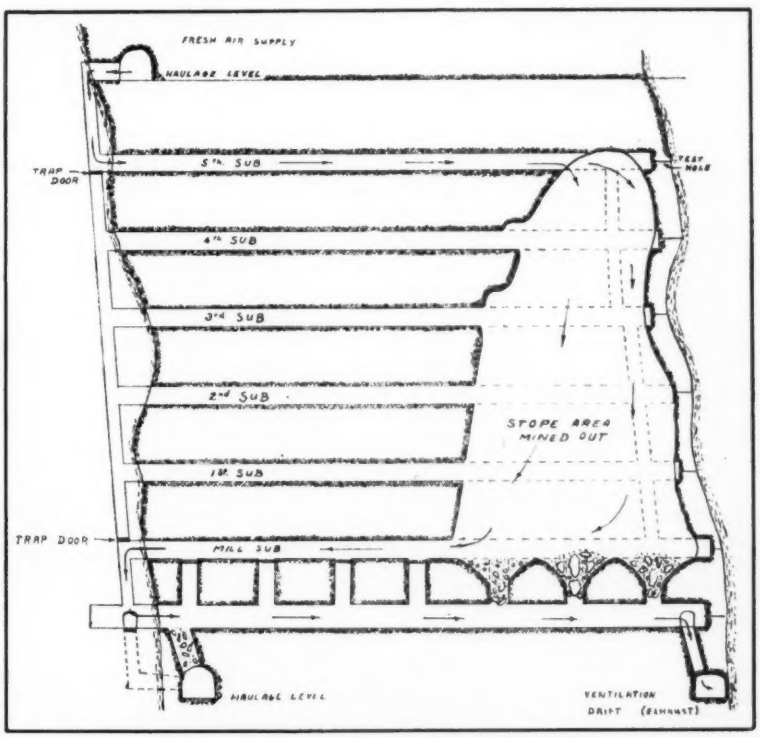
Occasionally a moil breaks and throws the man off balance or the chunk unexpectedly shatters when the man's full weight is on the machine with the same result. A man reducing chunks on the grizzly must be sure-footed and agile and alert at all times to avoid slipping or being thrown off balance. We had one case where the moil point bounced off the chunk and punctured a man's foot. After this incident one machine manufacturer was prevailed upon to re-design the throttle valve so that a moil point can be started into a chunk on "half-air" and, when the danger of the point slipping or bouncing off is past, the machine can be opened up to its full power.

Slusher Presents Hazards

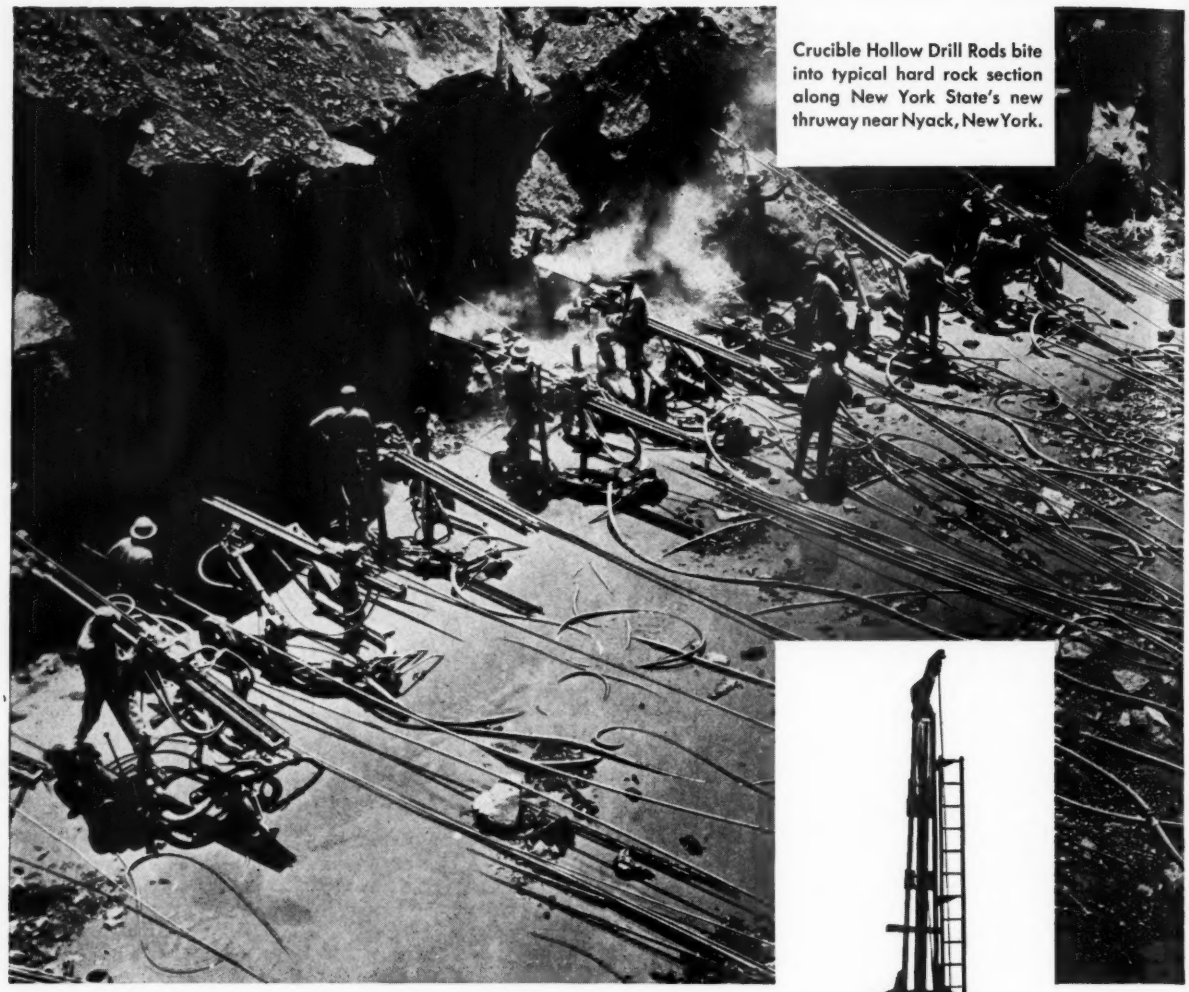
The operation of the slusher carries with it some degree of hazard unless certain precautions are followed. First of all, the machine must be securely anchored to its foundation. Large machines are usually bolted to a concrete footing. Smaller ones can be spragged tightly with good sound poles in the cup depressions cast into the base plate. Some operators use steel jackbars for this purpose. As a safety precaution, a couple of eye-pins can be placed in the floor behind the slusher and the machine harnessed thereto with a sling of half inch or larger wire rope.

The possibility of the pull-rope

(Continued on page 44)



Good ventilation is a distinct aid to safe operation



Crucible Hollow Drill Rods bite into typical hard rock section along New York State's new thruway near Nyack, New York.

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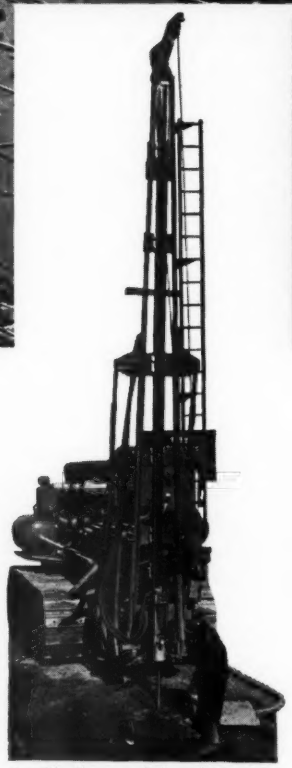

Joy Challenger drill and Crucible Hollow Drill Rod at work on New York State Thruway, Arden, N.Y.

CRUCIBLE first name in special purpose steels

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Roof-Bolt Compression Pad

A New Device for Measuring Tension in Roof Bolts

By LEONARD OBERT and A. J. BARRY

Supervisory Physicist and Supervising Methods Research Engineer, Respectively, U. S. Bureau of Mines

THE mining industry is now using 2,000,000 to 3,000,000 roof bolts a month to support and reinforce the roof and walls of mine openings. The effectiveness of the bolting system used depends upon the bolts being tightened to some predetermined tension. A knowledge of changes in bolt tension after installation provides valuable information in planning bolting methods, checking installations, and carrying out research projects involving roof bolting.

In the past the mining industry has had no practical method of measuring bolt tension directly. Although in experimental tests installed bolt tensions have been measured with electrical strain gauges cemented to the bolts and with strain gauge load cells, these procedures are too complex for most routine applications.[1, 2] The torque wrench provides an indirect means of measuring bolt tension. It is employed to measure the torque applied to both slotted-type and expansion-type bolts and the bolt tension calculated from a torque-tension relationship established from laboratory and field experiments.[3, 4] However, the results so obtained vary considerably and cannot be used with reasonable accuracy when the nut digs into the bearing plate or when the bolt-nut thread becomes damaged or otherwise functions improperly.

Design Work

To provide the industry with a simple inexpensive means of measuring bolt tensions directly, a device—referred to as a roof bolt compression pad—has been developed. The original model for the device was designed by the Bureau of Mines in 1951. Since that date the Bureau has been working with the Goodyear Tire & Rubber Co. to develop an inexpensive production item. The compression pad has been thoroughly tested in the laboratory, and the final product, which is now in production, will permit rapid determination of bolt tensions up to 20,000 lb with an accuracy of approximately (±) 1000 lb. It is designed for use with one in. diameter slotted-type bolts as well as smaller diameter expansion-type bolts. Bolt tensions can be measured when the bolt is installed and at any time thereafter. Use in the field will be required to determine the range of applications and the limitations of the new device.

The compression pad, simulating a rubber-in-steel sandwich, consists of two circular steel plates, ⅜ in. thick and six and five in. in diameter, between which a layer of rubber ⅜ in. thick is bonded. A sectioned compression pad is shown in figure 1. A center hole is provided for inserting the roof bolt. In practice, the device is placed between the bolt head or nut and the mine roof in place of the usual bearing plate. As the tension in the bolt is increased, the rubber element in the pad is compressed and at the same time expanded laterally. By measuring the increase in the circumference of the rubber with a calibrated gauge, the bolt tension can be determined. Figures 2 and 3 are photographs of an installed compression pad and the gauge, respectively, and figure 4 is a graph showing the relationship be-

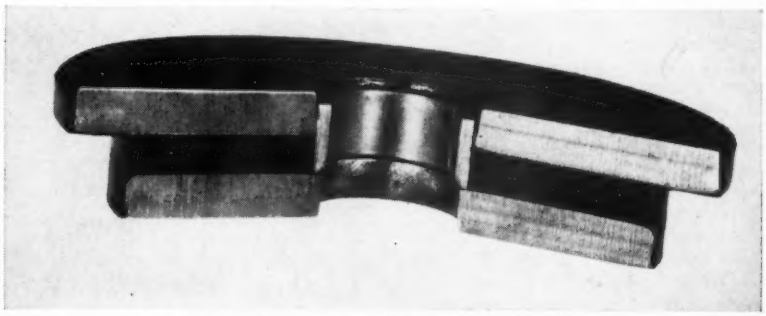


Fig. 1—Section of a roof bolt compression pad

Fig. 2—Compression pads installed with roof bolts to indicate bolt tension

[1] Barry, A. J., Panek, L. A., and McCormick, J. A., Anchorage Testing of Mine-Roof Bolts, Part 1. Slotted-Type Bolts, Bureau of Mines Rept. of Investigations 5040, 1954, 12 pp.

[2] Barry, A. J., Panek, L. A., and McCormick, J. A., Use of Torque Wrench to Determine Load in Roof Bolts, Part 1. Slotted-Type Bolts, Bureau of Mines Rept. of Investigations 4967, 1953, 7 pp.

[3] *Ibid.*

[4] Barry, A. J., Panek, L. A., and McCormick, J. A., Use of Torque Wrench to Determine Load in Roof Bolts, Part 2. Expansion-Type ¾-Inch Bolts, Bureau of Mines Rept. of Investigations 5080, 1954, 17 pp.

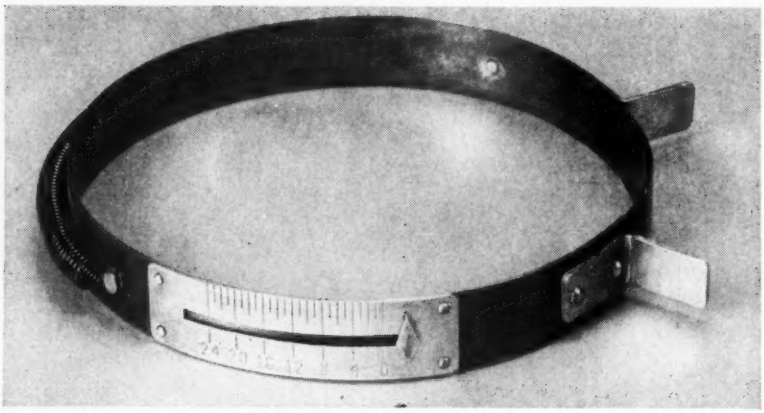


Fig. 3—Compression pad gauge

tween the load on the pad and the gauge reading. At 10,000 lb the accuracy is approximately ±1000 lb. This device is considered sufficiently accurate for all practical applications.

Their Use in Bolting Systems

In providing a simple means for measuring bolt tension the compression pad may be used for a variety of purposes. Examples of some applications follow.

For mines in which the bolting system, that is, the spacing and diameter of bolts, has been established, the pads may be used:

(1) To evaluate anchorage effectiveness, the ability of the various bolting materials to initially anchor, and to determine to what extent point-to-point variations in the rock within a bolt hole or area-to-area variations within the mine affect initial anchorage.

(2) To measure installed tension and the tension at any time thereafter. As a general rule of thumb for insuring proper reinforcement, bolts should be initially installed in stratified roof rock at a tension equal to about 50 percent of their yield strength and remain reasonably near this tension thereafter. There are notable exceptions to this rule. In no instance should the load approach the yield strength of the bolt. If the bolting system shows a general load increase, a roof instability is indicated.

(3) To check the installation procedures and workmanship. Failure to develop the proper anchorage in the slotted-type bolt may result from several causes, such as oversize holes, bolt holes too deep, improper wedge thickness, or insufficient time to drive the bolt over the wedge. With expansion-type bolts, drilling of oversize holes or failure to properly tighten may result in improper anchorage.

(4) To check the quality of bolting materials. Bolt manufacturers generally maintain good production control with regard to quality of steel, nut and bolt thread match, dimensional

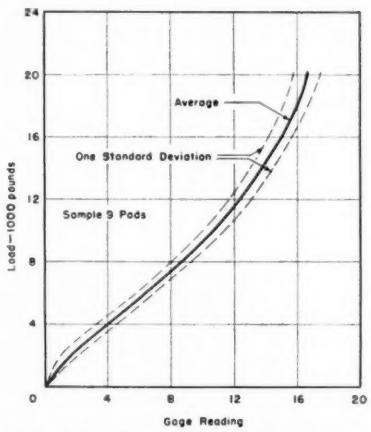


Fig. 4—Load vs. gauge reading. Goodyear Tire and Rubber Co. roof bolt compression pad

measurements and fabrication. However, field tests have disclosed that differences do exist in the various manufacturers' specifications, particularly with regard to nut and bolt thread match. Where bolts and anchor shells of different manufacture are employed, compression pads can be used to determine the compatibility of the assembly.

Determine Bolting Patterns

For mines in which the bolting system has not been established or for those in which a change in an existing system is necessary, compression pads should prove helpful in designing a satisfactory bolting system. Tests of the following types are generally performed in an experimental area:

(1) Determination of initial anchorage characteristics of roof rock and bolting materials. Hydraulic pull-test equipment is now used in these determinations, but the equipment is bulky and the test is time consuming. The compression pad can be substituted for the hydraulic jack for this purpose, simplifying the test and providing a means of determining the best combination of bolting materials and rock strata for optimum initial anchorage. However, the compression pad cannot be substituted for the complete pull-test equipment, which should include both hydraulic jack and extensometer.

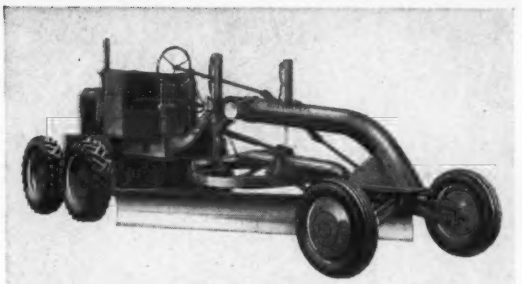
(2) Determination of the optimum bolt spacing (pattern) and strength. Generally the specifications for bolt spacing and strength (grade of steel and diameter of bolt) are based on experience gained in other areas of the mine or in adjoining properties. When this experience is lacking, the specification is sometimes arbitrary. Compression pads provide another tool to use in the quantitative approach to this problem. By studying various bolt patterns, bolt diameters, and grades of steel in an experimental area, the most efficient pattern and utilization of steel can be determined, thereby improving safety and possibly at the same time reducing costs.

"What did they say that yellow stuff was, Shorty?"

Model D *Standard* (GASOLINE ENGINE)

STANDARD EQUIPMENT: Six-volt electrical system, two headlights, one rear and stop light, muffler, 10-ft by ⅝-in. moldboard, hydraulic controls for moldboard lift, four 7.50-20 rear and two 6.50-16 front tires with tubes.

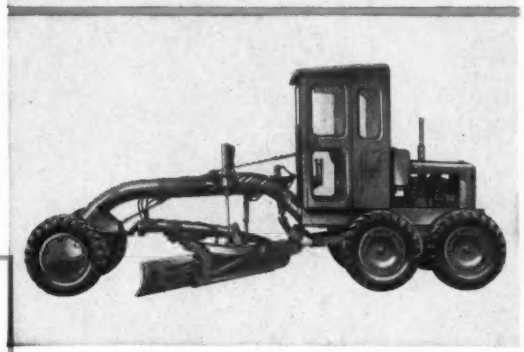
Total weight	8,800 lb	Blade pressure	4,900 lb
Wt. on front wheels	2,700 lb	Four speeds forward to	25.6 mph
Wt. on rear wheels	6,100 lb	Reverse to	3.3 mph



Model D *Special* (GASOLINE ENGINE)

FULLY EQUIPPED AS FOLLOWS: Six-volt electrical system, two headlights, one rear and stop light, muffler, 10-ft by ⅝-in. hydraulically shiftable moldboard, 6-valve control group, four 8.25-20 rear and two 8.25-20 front tires with tubes, front wheel lean, power circle turn, hydraulic scarifier, all-steel cab.

Total weight	10,900 lb	Blade pressure	6,450 lb
Wt. on front wheels	3,750 lb	Scarifier pressure	4,900 lb
Wt. on rear wheels	7,150 lb	Four speeds forward to	25.6 mph
		Reverse to	3.3 mph



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Both gasoline and diesel Model D's are available with any combination of accessories.

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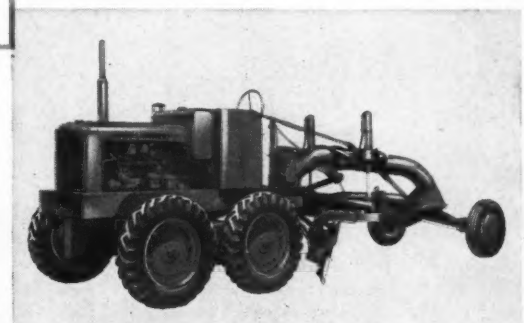
STANDARD EQUIPMENT: Twelve-volt electrical system, two headlights, one rear and stop light, muffler, 10-ft by ⅝-in. moldboard, hydraulic moldboard lift controls, four 7.50-20 rear and two 6.50-16 front tires with tubes.

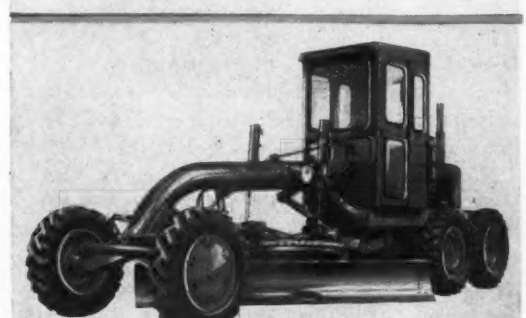
Total weight	9,350 lb	Blade pressure	4,900 lb
Wt. on front wheels	2,760 lb	Four speeds forward to	25.2 mph
Wt. on rear wheels	6,590 lb	Reverse to	3.2 mph



Model D Diesel *Special*

FULLY EQUIPPED AS FOLLOWS: Twelve-volt electrical system, two headlights, one rear and stop light, muffler, 10-ft by ⅝-in. hydraulic shiftable moldboard, 6-valve control group, four 8.25-20 rear and two 8.25-20 front tires with tubes, front wheel lean, power circle turn, hydraulic scarifier, all-steel cab.

Total weight	11,450 lb	Blade pressure	6,450 lb
Wt. on front wheels	3,750 lb	Scarifier pressure	4,900 lb
Wt. on rear wheels	7,700 lb	Four speeds forward to	25.2 mph
		Reverse to	3.2 mph



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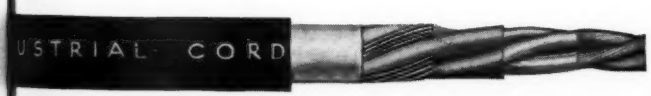

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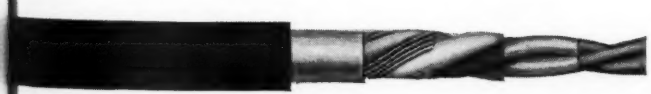

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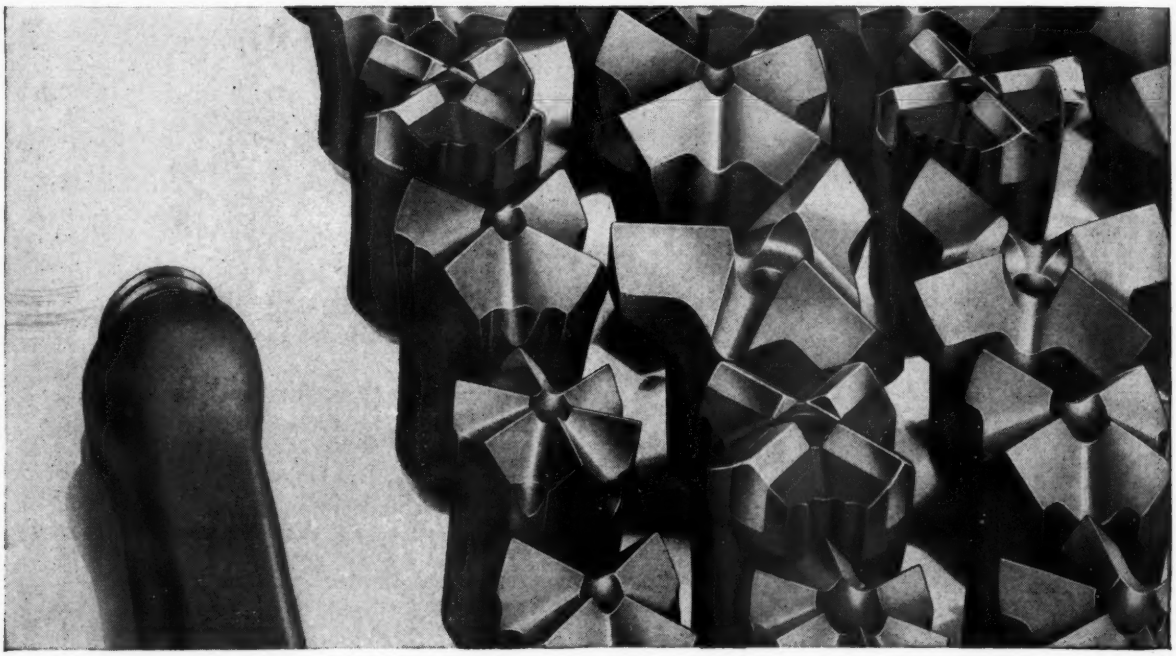

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Thrust and rotary speed should be selected to properly balance bit wear and rate of penetration

Thrust and Speed for Rotary Drilling

A Coal Division Study of the Importance of Thrust and Speed on Drill Penetration and Torque Requirements for Satisfactory Bolt Anchorage

By A. W. CALDER, ORVAL ROBSON and ROBERT FLETCHER

DURING the summer of 1953, the Roof Action Committee began a study of roof bolting operations. The committee was to investigate: (1) the optimum thrust and speed for most economical drilling; (2) the use and maintenance of tungsten carbide rotary bits, and (3) the tightening torque required for satisfactory anchorage of the roof bolts.

Thrust, Speed and Bit Life

When hard rock is being rotary drilled, the inevitable question arises, "What is the optimum thrust and speed for long bit life?" Before attempting an answer to this question, the effect of thrust and number of revolutions per minute on bit life should be studied and considered together with the resultant rate of drilling.

The curves in figures 1 and 2 show laboratory results for a 1⅜ in. diameter bit drilling under varying conditions of thrust and speed in limestone and sandstone.

Considering the drilling tests in soft sandstone first, these curves show how the drilling speed decreases as the distance penetrated increases and the bit gets dull.

Curve C on figure 1 shows the drilling speed for a bit thrust of 3080 lb at 400 rpm, and Curve D is for an equal thrust at 200 rpm. Note how much faster the bit initially drills under condition C, but also note how after drilling only 85 in., the slower turning bit outdrills the faster turning bit, which has now become duller though it has drilled the same distance.

A comparison of Curves A and B, determined by drilling tests, shows similar results. The bit life shown on Curve B is relatively good after over 300 in. of drilling (160 rpm, 3200-lb thrust). The drilling rate has decreased only 15 percent. A faster turning bit with a lighter thrust load (Curve A, 430 rpm, 2000-lb thrust) initially penetrated the rock faster than the slower turning, higher thrust loaded bit (Curve B). However, the important fact shows up after a depth of 190 in. have been drilled. At this point the drilling rates are equal, and after drilling 300 in., the faster turning bit (Curve A) is worn out whereas the bit shown on Curve B is drilling almost as fast as when it started.

These specific data pertain to a 1⅜ in. diameter spade type bit drilling in two types of sandstone. However, the results do show the effect of thrust and speed of revolution on bit life and comparable tests with other bits and rock have shown relatively the same results.

The effect of increased thrust on drilling speed and bit life is shown in figure 2. Here the rock is limestone. By increasing the thrust from 1800 lb to 3200 lb the rate of penetration, at a constant drilling speed of 600 rpm, increased from 9.2 fpm to 16.5 fpm.

From these curves it is apparent that: (1) faster drill speeds dull the bit more quickly, and (2) increased thrust results in faster penetration (provided the thrust is within the ultimate strength of the bit). Thus longer bit life is achieved when rotary speed is at a minimum and thrust is sufficiently high to advance the bit at least 1/16 to 3/32 in. per revolution.

When considering the bit cost only, the most economical bit speed would be the fewest revolutions per minute for satisfactory operation. However, other factors, such as labor, depreciation costs, and "keeping up with the mining cycle" must be considered also. Until a dollar value is assigned to the importance of 8 to 10 fpm drilling speed versus 4 to 5 fpm, it is impossible to state any specific thrust or speed that is most economical. Surely the importance of the rate of penetra-

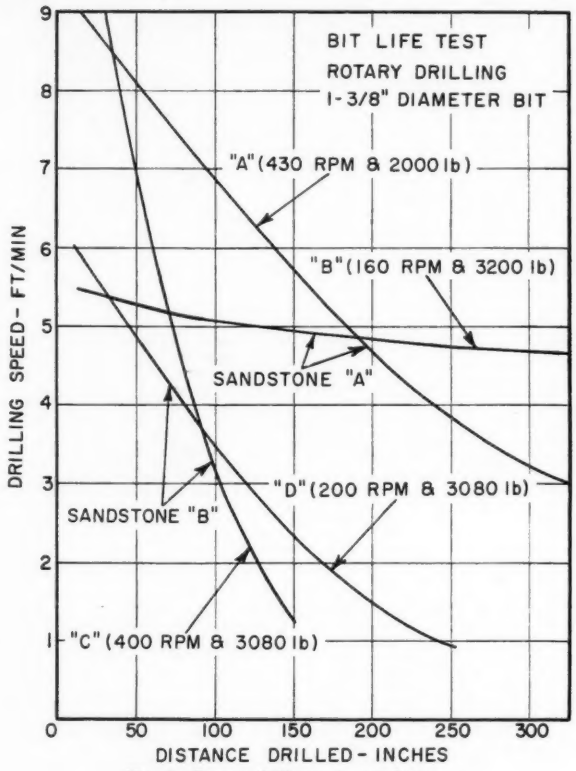


Fig. 1—Rotary drill test in sandstone

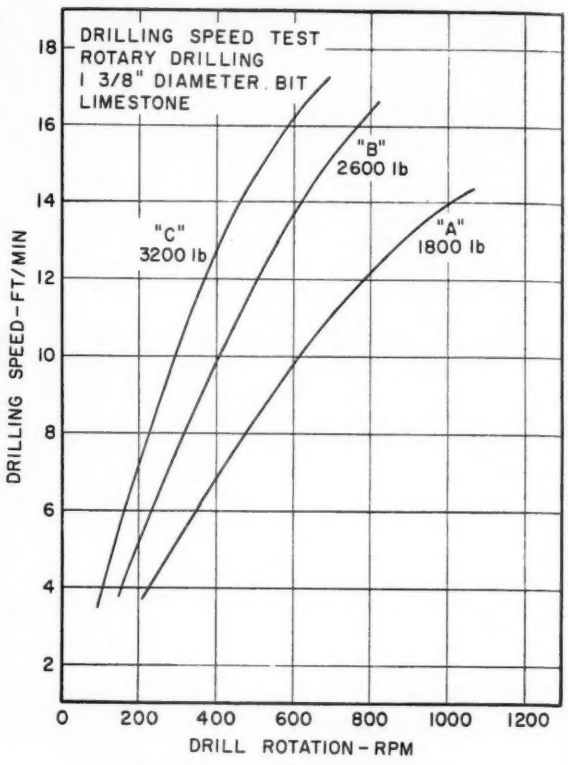


Fig. 2—Rotary drill test in limestone

tion will have a different value in two mines if 80 bolts per shift are sufficient to keep up with the cycle in one, and 180 per shift are required for the second.

Drilling Techniques

It is common for rock strata immediately above coal seams to vary in hardness and drillability. Therefore, if maximum bit life is to be achieved the drill operator must learn the "feel" of drilling and detect the harder layers by the reduced rate of penetration and change in sound from the bit. When hard streaks are encountered the driller should reduce the drill speed until the advance per revolution is between 1/8 and 3/32 in. to prevent burning the bit.

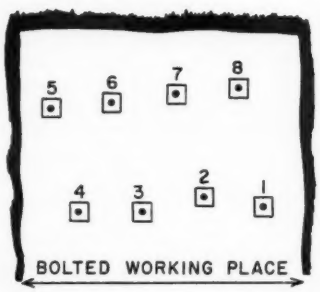
In softer drilling, and particularly when the rock is wet, a higher drill speed is often required to convey the cuttings from the hole to prevent binding of the auger.

Augers and Carbide Bits

Various sizes and assortments of bits are in use, but the ones this report will discuss are the flat, solid or arrow head and two-prong types.

In quite a number of operations two sizes of bits are used. One for a starter bit (which in most cases drills most of the hole), and a finishing bit. Starting bit sizes can be of the same size as used for coal drilling (thus eliminating odd sizes, between finish-

1" WEDGE TYPE BOLTS – 5' LONG



	BOLT 1	BOLT 2	BOLT 3	BOLT 4	BOLT 5	BOLT 6	BOLT 7	BOLT 8
ORIGINAL FT/LB TORQUE	270	230	310	255	255	260	240	250
LOAD RATING IN LBS								
JUNE 26	6,830	7,000	11,550	8,850	9,530	8,700	8,300	8,380
1 HOUR LATER	7,560	7,040	8,450	7,560	7,750	6,160	8,350	8,510
JUNE 27	7,060	6,830	7,490	7,720	7,790	8,700	8,750	9,620
JUNE 30	6,090	6,610	4,910	7,140	6,660	8,040	8,760	11,080
AUGUST 14	9,600	13,650	23,500	11,700	17,100		13,700	23,200

Fig. 3—Data showing how bolt loading varied with elapsed time in a Pittsburgh seam mine

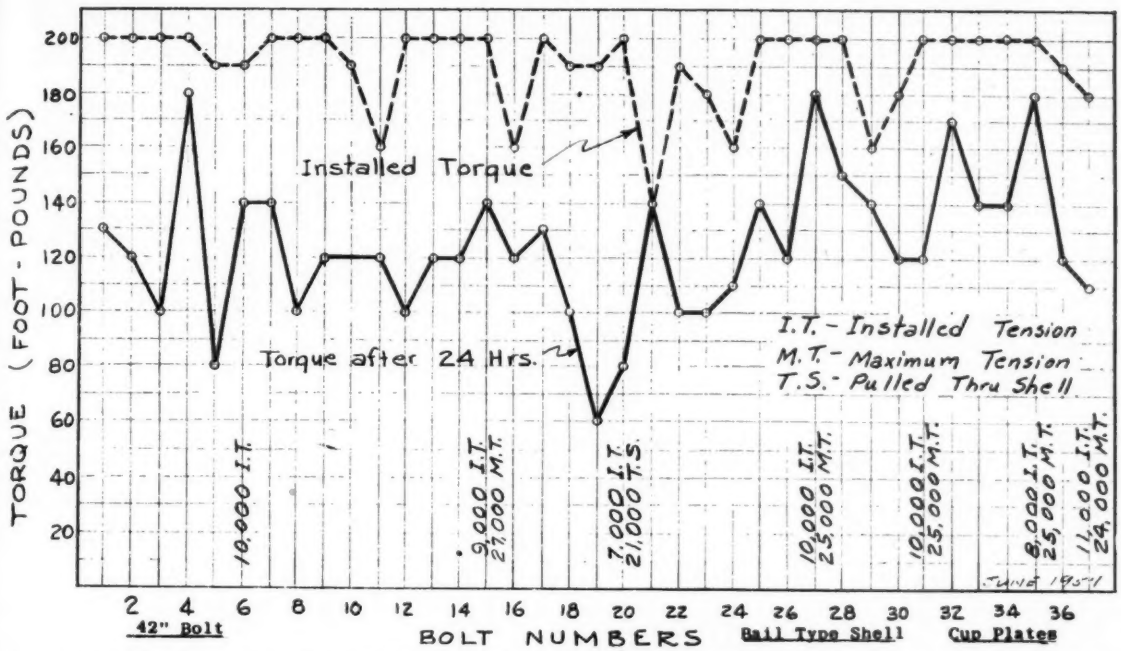


Fig. 4—A check on toruque readings 24 hrs after installation in an eastern Kentucky mine showed that in nearly all cases there was a drop in torque

ing bit and size used on coal—this has its effect on dollars tied up in inventory). However, others may prefer an in-between size.

Two-prong bits are used in drilling soft, medium and hard roof strata, but care should be exercised in drilling softer material so as not to cause too much rifeling of the hole. If this occurs it sometimes becomes difficult to insert expansion shells. One way to ream out a rifled hole is to use an auger 1/16 in. smaller in diameter than the finishing bit; this method of reaming is very satisfactory.

Flat, solid or arrow head bits are used for drilling hard and very hard strata. Experienced men—men who know the "feel" of the drill—will use increased thrust pressure and slower drill speeds to do a successfull drilling job.

Bit Tips

The following points should be carefully studied by the mine operator using rotary roof drilling equipment.

When is a drill bit dull? There has been quite a bit of discussion and controversy over this question. The answer must of necessity be an empirical one and the following value has been selected as a guide to when a bit should be resharpened: dullness of tool should not exceed 1/16 in. on the corner of flat bits or on the edges of prong type bits.

Resharpening of bits and re-conditioning of tools is an all-important part of the program. Proper sharpening of tools can be the one item that makes a roof bolting program profitable. On the other hand, improper sharpening can break the program. This may seem like over-emphasis, but consider the consequences. Improperly sharpened tools can chip or break, rendering them completely useless. Properly conditioned tools on the other hand can be used over and over.

Only skilled workmen should be employed to resharpen bits, men who are adept and receptive to necessary procedures for proper carbide tool reconditioning. Such a workman will save many times his salary, by following through proper procedure. The sharpening job should never be relegated to a man who does not have the interest or ability to do the job properly.

Where contract re-conditioning by a commercial bit grinding service is available, it will be well worth any operator's time to investigate the advantages of such a program.

Keep Full Records

Reports have a sound economic value, in the use of carbide tools for roof drilling. A daily or weekly record of what happened to the bits on each and every section on any shift will provide information that can indicate one of the following: (1) Changes in roof strata from one shift to another; (2) The necessity of making mechanical adjustments on the drill; (3) Point up the fact that one or more crews may be efficient or inefficient. When the cause of high maintenance is discovered, improper corrective measures can be taken.

Templates or gauges are desirable for shop re-conditioning of tools, provided that the man who does the grinding makes proper use of them, instead of adopting his own methods.

Distinguishing between bits of similar design. A satisfactory solution to this problem has not been found—however it has been suggested that the bits could be painted different colors or that the shank ends could be stamped with a different distinguishable color by the use of a paint pad after the bit has been resharpened.

Off-center bit grinding. The practice of grinding one prong shorter on a prong type bit in the belief that larger diameter holes can be drilled will cause crooked holes which in most instances are useless. Such drilling will also cause undue wear on auger scroll. Using worn auger chucks has the same effect.

Wet drilling. Wet drilling has been used to cool the cutting tool when drilling hard, abrasive rock, thus obtaining better bit life. In addition to protecting the bit from excessive heat, wet drilling has proved to be an effective and relatively simple means for satisfactory dust suppression.

General

Most expansion shells are standard for 1⅜ in. diameter holes. Therefore, after much discussion it has been proposed that instead of buying 1⅜-in. solid head bits, a bit a size or two larger be purchased and used as a

starter; after it has been worn down by use and regrinding and the gauge is finally reduced to 1⅜-in. it can be used as a finishing bit. Theoretically, this should increase bit life in some instances by about one-half.

Solid blade bits have a definite advantage as starters. They do not tend to creep or walk when starting a hole, thus reducing mis-alignment of drill, chuck and auger.

Carbide grade should be considered in selecting a proper tool for strata of various hardness or abrasiveness.

A certain amount of flexibility between auger shank and drive socket is desirable to help eliminate auger breakage due to mis-alignment of drill. This in effect gives a universal action to the connection.

Variation in Bolt Torque Readings

Another problem that has received considerable study deals with variation in torque reading on bolts.

Eliminating errors, the torque on the nut of a roof bolt is directly proportional to the bolt loading. Figure 3 shows a chart of eight bolts installed at a coal face in a Pittsburgh Seam mine. Loading was determined by strain gauge, with readings being taken at time of installation, one hour later when the next cut was removed, the following day, and twice more within a period of two months. These readings show how the load on the bolt varied.

Figure 4 charts the torque readings on bolts in an Eastern Kentucky mine. In nearly all instances there was a drop in torque.

It has been determined that a drop in torque, after correct initial installation of bolts, does not indicate the bolts are failing in their job of roof support. Under "pull-out" test the bolt will give approximately the same ultimate result. Once installed, torque reading variations are believed due to pressure waves within the roof strata. As the face advances, or nearby areas are opened, roof load on the bolt may change. It has been noticed that where cap boards are bolted to the roof, the wood may shrink. Likewise, where a bolt is over-tightened, twist in the bolt may release when the next face is shot. However, when a shell is firmly set, "pull-out" remains the same, though torque or load readings taken at different times on any one bolt may vary.

One test indicated that as installation torque increased to 195 ft lb, "pull-out" increased. Beyond this point "pull-out" fell off. Over the industry there has been a wide divergence of opinion on correct torque. However, it is now generally accepted that a bolt tightened to from 150 to 175 ft lb is adequately set. There are indications that over-tightening has detrimental results. Excessive twist has been shown to reduce the ultimate strength of the steel.

Roof strata at the anchorage point may determine the torque standard. A shell anchored in soft material can be over-expanded, or may twist in the hole.

Consideration should also be given to the initial load supported by a bolt. This will vary with the length of bolt and the beam structure. To pre-load a bolt by over-tightening may result in decreasing its ultimate support strength as a member of a roof beam.

Therefore, initial torque must be the governing factor for setting the shell. Later variations in torque or load readings indicate roof pressure variations rather than the loosening of the shell. Initial torque determines ultimate "pull-out."

Most machines installing bolts are adjusted to slip at a certain torque setting. To gain constant results from these machines the operators must be acquainted with the fact that working torque is reduced by:

(1) Frictional loss due to rubbing of the tightening tool on the shin plaster.

(2) Galling of the bolt head on an angling plate.

(3) Rusty threads.

(4) Partial closing of operating valves.

In the final analysis, the drill machine operator is the man on whom the entire bolting system depends. It is hoped some of the information in this paper will ultimately reach him, for it has been noticed, that the most successful installations are generally those where the reasons behind the job are understood by the working man.

Safety on Scraping Subs

(Continued from page 33)

breaking and the loose end whipping back toward the operator is ever present. Substantial guards of heavy wire mesh or round steel rods should be hung immediately in front of the machine to prevent any loose ends from striking the operator. The tops and backs of the slusher drums are generally equipped in the factory by covers which may shake loose, drop off, and are not replaced until the safety engineer demands it. Attention to these details should be a part of routine maintenance. The handling, cutting, and tieing of slusher rope, particularly when it is badly worn, is rough on the hands. Heavy gloves are definitely indicated for this kind of work.

A slusher should never be operated while anyone is near the ropes or scraper, for obvious reasons. A safe rule is that the motor must be shut off before anyone steps over or under the ropes or attempts any repair, maintenance, or servicing of any part of the machinery. When not in use, both clutch bands should be completely released so that, should the motor be accidentally started, the scraper cannot move and injure someone in the transfer drift.

Good Light and Air Needed

Good illumination is essential in the scraping operation. The old "scraping by feel" went out with the carbide lamp. Wherever there is electric power there can also be good illumination, and the so-called "sealed-beam" bulbs are a natural for underground work. Ventilation is equally important since even the "sealed-beam" will not shine very far through heavy smoke or dust. Some superbrain once developed a formula by which the relative activity of the ant could be calculated at varying temperatures. There may be some such ratio between the purity of the air and the productive capacity of a miner, with obvious limitations, of course. The law of diminishing returns is still in effect.

To sum up this review of Safety on the Scraping Sub, it must be observed that the general rules of safety in mining apply here as well as in any other mining operation. Past experience at Inland Steel and elsewhere is of the utmost value in recognizing hazards as well as in taking the precautionary measures needed to minimize or eliminate them. However, effort should not stop with profiting by mistakes—study of conditions and methods must never be relaxed but thinking must be carried through, to thoroughly explore all possibilities, so that the apparent remedy of one condition does not develop some new, unforeseen hazard. Safety is largely a matter of common sense on the part of the individual, but the individual cannot be expected to avoid an unrecognized hazard, nor to automatically, with no previous instruction, perform his duties with the utmost efficiency. Proper training is essential in the development of safe workmen, but constant reminder is also necessary in keeping employes safety conscious, and it is the duty of supervisors to see that this necessary part of the safety program is not neglected.

Comments on Caving At Climax

From a 250 tpd mill in 1918 to 27,500 tpd in 1955, the story of Climax Molybdenum Corp.

Careful Planning and Attention to Detail Help Increase Production Cheaply and Safely

By ROBERT HENDERSON
Resident Manager
Climax Molybdenum Co.

IN general, the principles of caving are fairly well understood but occasionally, inattention to, or misunderstanding of, some part of the whole operation causes difficulty.

Problems discussed here are the result of observation at Climax—and we have had our share of troubles. The importance of these problems varies greatly from one mine to another or even from place to place in one mine, depending on local conditions. It is impossible to set standards to cover all conditions but consideration of problems one by one can do much to straighten our thinking.

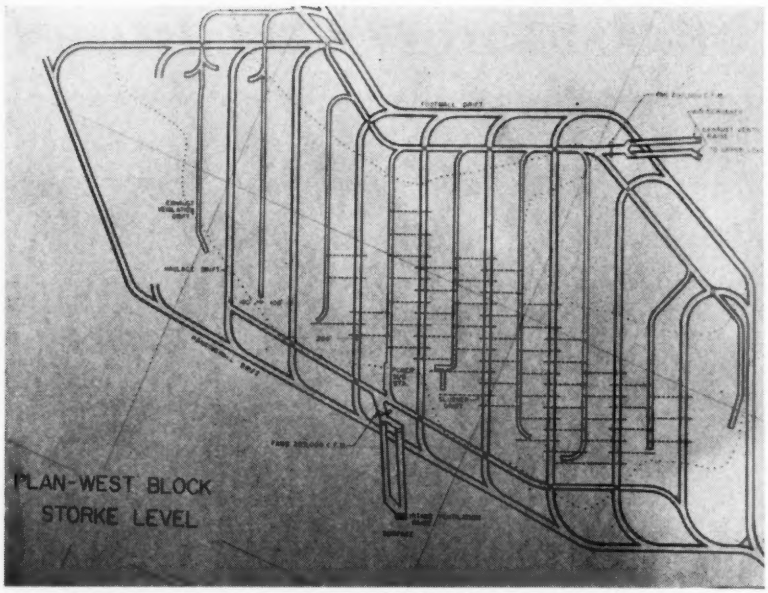
Removal of pillars in stopes to be caved has caused difficulty in certain areas. At first glance it would seem that removing stope pillars would be a very simple job. All that need be done is to drill holes in the pillars, load them and blast. However, if the pillars are not completely removed, the caving action cannot take place as it should and there will be little, if any, production. Further than that, weight will be transmitted through the remaining stubs and concentrated pressures will show up on the sill pillars. At Climax, the concreted fingers leading from the slusher drifts to the cave area, and in some cases sections of the slusher drifts, have been crushed. Production has been held up until the necessary repair work has been completed. This, in turn, produces trouble in controlling the draw from the area.

Many Factors Need Study

Many elements must be studied such as, type and fracturing of the rock, size of the pillars in relation to the size of the openings in the stope, size and location of the holes drilled in the pillars, the loading and priming of these holes and the sequence of blasting the pillars. We have found that it is most desirable to be able to inspect the pillar area after the blast for stubs. This means that only a few pillars can be shot at one time. It also means that the broken rock from the blasted pillars must be removed quickly to allow for inspection before damage is done. Slushing equipment must be installed before blasting to remove this rock. If stubs of pillars are found, they must be removed by blasting again. Anyone who has tried to reblast stubs of pillars knows that this is not attractive work and that careful preliminary planning and execution give better results.

Likewise, it has been found that pillars over large openings such as haulageways and cutouts should be removed in the sequence of retreat blasting rather than allow them to remain at the boundary of the cave. This means that several rows of pillars may have to be removed in a single blast and that inspection will be more difficult. If this is not done, arching in the caved area may place too much weight over these openings and lead to expensive and unnecessary repair work.

The transfer of weight over large areas has caused loss of production and high repair costs even though the pillars were completely removed in the stoping areas. After the pillars were removed, an arch was formed and weight was transmitted to the sides of the stoped area. A study of the natural weakness planes in the area, coupled with careful planning of the



Good area draw requires well planned development plus good equipment carefully installed

development, blasting and draw, are required to minimize trouble from this source.

Cutoffs Help Control Load

Cutoffs help to avoid the formation of large arches and make it possible to start a cave in a new location quickly. Of course, natural planes of weakness such as faults can assist the caving action but they can also lead to difficulty if not properly evaluated. At Climax, a horizontal opening of 110,000 sq ft was made recently and caving did not begin promptly, although the rock appeared to be well fractured. Further work had to be done to start the caving action before development could be carried on safely in adjoining stopes. Cutoffs would have eliminated the need of this extra work and would have avoided the possibility of an air blast. The extra work took considerable time and badly needed productive capacity was temporarily lost until this condition could be corrected. The failure of proper caving action usually leads to poor breaking action in the cave, results in high secondary blasting costs and increases the safety hazard.

Must Supervise Draw

Another detail that may be easily overlooked is area draw. The workmen naturally try to get the ore wherever it is available and easy to handle. This is not necessarily good caving practice and ultimately leads to more and harder work as well as loss of ore. Good supervision and selling are necessary to overcome this natural tendency. Well planned area draw leads to good recovery of ore at the best possible grade. Secondary blasting is reduced. This reduces costs for maintenance as well as loss of time needed to do the repair work. Good area draw can be practiced only in those places where development has been well planned and carried out and good equipment has been carefully installed. At Climax the ore is drawn to maintain an inclined contact between the ore and waste.

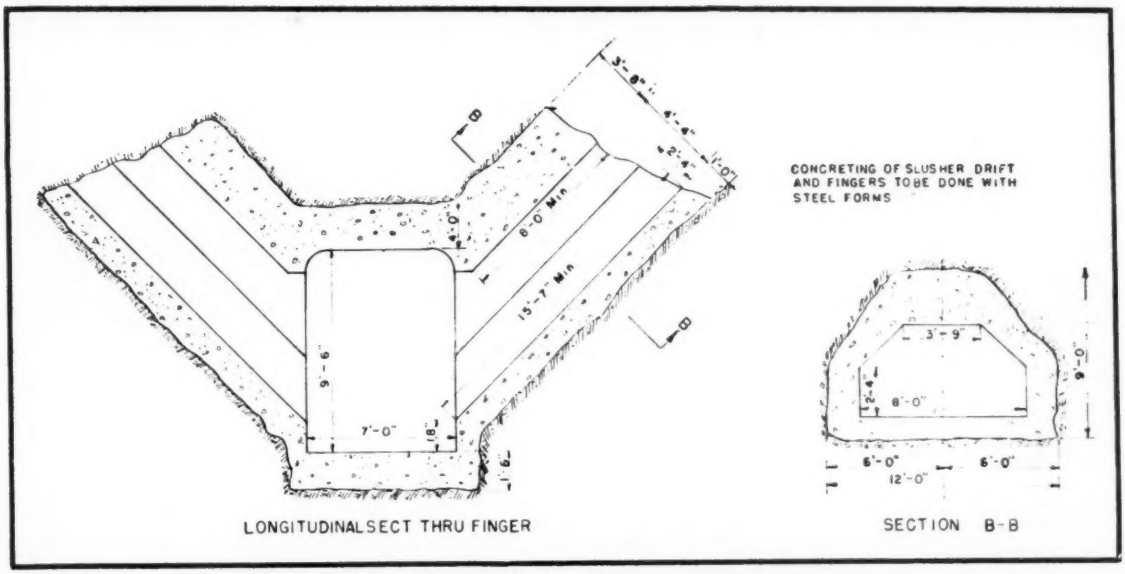
The relationship of finger spacing to the characteristics of the ore should be studied carefully. In certain types of ore, or where the ore goes to surface and dilution is no problem, this spacing may be comparatively great. In other cases where the ore breaks easily, closer finger spacing is indicated. Additionally, closer finger spacing reduces the tonnage of ore to be drawn through each finger in any given block. At Climax, experience has shown that approximately 40,000 tons of ore can be drawn through a concreted finger before it has worn to such an extent that repair work is necessary. Softer ores or less secondary blasting would allow greater tonnages to be drawn. If the finger spacing can be adjusted to meet conditions, better recovery can be expected as well as a minimum amount of repair work.

The slusher drifts, cutouts and fingers in the Climax mine have been concreted for many years. Experience has shown that several points can be influential in improving the efficiency of the operation. One of the first things that was learned the hard way was that reinforcing steel should be omitted in the fingers or other places where heavy concussion resulted from blasting. In these locations, a homogeneous mass of good concrete has given far better service than reinforced concrete.

There are several details in finger design that may not be obvious to

BUILDING DATA RECENT MILLS

Name of Mill	*Location*	*Year Completed*	*Structural Frame*	*Type of Roof*	*Roof Material*	*Wall Material*	*Windows*	*Final Condition of Site*
Deming Mill	Deming, N. Mex.	1950	Steel	Sloping	Corr. G. I.	Corr. G. I.	Few	Level
Golden Cycle	Cripple Creek, Colo.	1951	Steel	Sloping	Corr. G. I.	Masonry	Few	Stepped
Triumph Mining Co.	Hailey, Idaho	1951	Steel	Sloping	Corr. G. I.	Corr. G. I.	Few	Level
Chuquicamata	Chile	1952	Steel	Sloping	Corr. G. I.	Corr. G. I.	Many	Stepped
Kaiser Fluorspar	Fallon, Nev.	1952	Steel	Sloping	Corr. Alum.	Corr. Alum.	Many	Level
Barvue	Barraute, Canada	1953	Steel	Sloping	Corr. G. I.?	Corr. G. I.	Few	Level
Climax	Climax, Colo.	1953	Steel	Sloping	Corr. G. I.	Corr. G. I.	Few	Level
Reserve	Babbitt, Minn.	1953	Steel	Sloping	Corr. G. I.	Corr. G. I.	Many	Level
Pilotac	Virginia, Minn.	1953	Steel	Sloping	Corr. G. I.	Corr. G. I.	None	Level
West Hill	Coleraine, Minn.	1953	Steel	Sloping	Corr. G. I.?	Corr. G. I.	None	Level
Humboldt	Humboldt, Mich.	1954	Steel	Sloping	Corr. G. I.	Corr. G. I.	Few	Stepped
Indian Creek	Indian Creek, Mo.	1954	?	Sloping	?	?	Few	Stepped
White Pine	White Pine, Mich.	1954	Steel	Sloping	?	?	None?	Level
Silver Bell	Pima City, Ariz.	1954	Steel	Sloping	Corr. G. I.	Corr. G. I.	Many (Plastic)	Level



Finger raises and slusher drifts have been concreted for many years

everyone without a considerable amount of experience. In the slusher system it has been found desirable to have a step at the point where the finger bottom joins the slusher drift. This step allows the ore to slide out of the finger and prevents the formation of a bank of fines that eventually chokes the finger.

Finger bottoms are concreted beyond the vertical plane from the finger backs. This feature aids in reducing the number of hang-ups in the fingers and leads to better safety and efficiency.

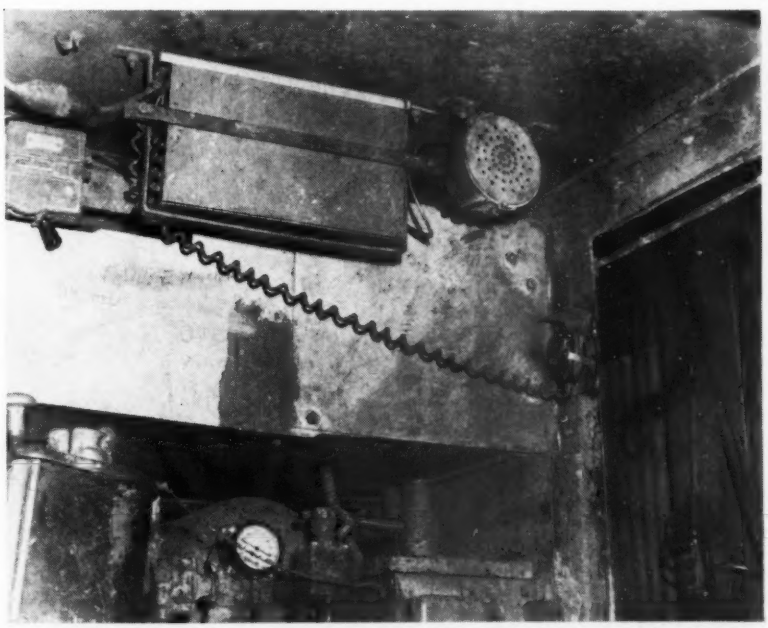
Arched concreted backs in the fingers follow the natural wear pattern and reduce repair work to some extent as well as strengthen the fingers. These arches can be helpful for short periods in cases where stubs of pillars are left directly over the fingers in the stopes.

Balance of the size of installations and equipment to the tonnage to be produced can be most important. Money will be spent to no advantage unless a balance is obtained by thoughtful analysis. At Climax, the main haulageways are nine ft high by 12 ft wide. Three-ft gauge track of 60 and 90-lb rail is standard for these drifts. The Granby type ore cars are seven ft high by six ft wide and have a capacity of 200 cu ft. The discharge points from the slusher drifts to the cars are 3⅔ ft by 6½ ft. The slusher drifts are concreted seven ft wide by 9½ ft high, with fingers on both sides of the drifts on 33⅓-ft centers. Staggered series of parallel rails are concreted in the drift bottoms. The concreted fingers are eight ft wide by 4½ ft high normal to the slope. One hundred fifty hp hoists are installed in the slusher drifts for handling the six-ft folding scrapers. For this operation these installations give a reasonable balance.

Ventilation Is Important

Many other items contribute to the efficiency of the slusher system. Ventilation must not be forgotten, not only for the welfare of the men, but also for the illumination of the working places. If dust and smoke are not removed quickly, visibility is reduced and production decreases. Fresh air is drawn continually past the slusher operator and discharged at the end of the slusher drift to an exhaust ventilation system of drifts.

Communications between dispatchers and motormen, slusher operators and whistle punks, and effective signals between other workers are a necessity for good operations. Here, a carrier wave trolley phone system is used between the motormen and dispatchers. Light signals are installed between the slusher operators and whistle punks. As yet, no improvement has been made on air whistles used to spot cars for loading although several ideas have been tried.



Good communications are a must for good operation. A carrier wave trolley phone system links motorman and dispatcher

Special cable changing cars for the slusher hoists have been built. Much time is saved by these cars and the cleanup of the mine is improved. Small tugger hoists are installed with the 150 hp hoists to handle broken cables that have to be pulled together for tying, as well as many other odd jobs that have to be done. Many other devices are used throughout the mine to increase safety and efficiency. It is a very easy matter to overlook the value of these appliances but, once used, they will not be discarded.

Balance Development Work

It is only natural for all mine operators to want to have plenty of development work done ahead of production but there is a limit to the amount that can be done safely. As has been mentioned previously, each property has its own special problems and these are discovered by trial and error with good analyzing. If too much development work is done ahead of that necessary for production, flexibility of operations may be reduced and money may be wasted. It may not be possible to change easily to take advantage of new ideas, methods and equipment that may increase safety and efficiency.

At Climax chutes and shrinkage stopes were used originally. On the White Level this system was replaced by the chute and grizzly system and an improvement in the operations resulted. When the Phillipson Level was started the chute and grizzly system was installed in the production area but a great deal of advance development work was done also. Grizzly drifts were driven, chutes built and raises and grizzly chambers cut out.

In the mid-thirties, experimental work was carried out on the slusher system and by 1940 all new installations were made for this system. All of the advanced work for the chute and grizzly system in one part of the Phillipson Level was abandoned and the money spent was lost.

The early slusher system had the slusher drifts driven on both sides of the haulageway or what is referred to here as double-ended slusher drifts. The finger spacing was on 50-ft centers. Now the finger spacing is on 33⅓-ft centers and the slusher drifts are driven in one direction or single-ended. If too much advance work had been done, it would have been more difficult to have improved the operation quickly and easily.

From this very brief description of the changes in the mining systems at Climax, it can be easily seen that several factors must be considered in making plans for the system to be used. The following list may be useful in making plans but should not be considered complete:

(1) Size, shape and characteristics of the orebody and waste rock.
(2) Production requirements.
(3) Importance of draw control.
(4) Drawpoint spacing.
(5) Ventilation.
(6) Servicing of working places.
(7) Materials and equipment available.
(8) Safety.
(9) Communications.

The ideas brought out in this discussion are the result of the cooperation of the Climax staff. It may be that I have not expressed them well enough to prevent misunderstanding but that is my fault and no blame should fall on the other members of the Climax team.

Bagdad Open Pit

(Continued from page 25)

the pit to the secondary crushing plant is as follows: Ore is loaded into trucks for hauling to the primary crusher, a distance of some 600 yd. Here the ore is dumped into a receiving hopper with a sloped bottom. This discharges onto a 5 by 12-ft scalping screen, or live grizzly having 4½-in. bar spacing. The undersize goes by chute to a 36-in. conveyor, oversize is passed into the 40 x 42-in. jaw crusher which also discharges onto the belt. The operator controls the feed by starting and stopping the screen.

The crusher conveyor belt, which is 160 ft long at an incline of plus 12½°, discharges into the ore storage pocket which holds approximately 5000 tons. At the bottom of the pocket a 3 by 8-ft pan feeder transfers the material to the main conveyor. This pan feeder is equipped with a variable speed drive, allowing the operator to adjust the tonnage according to the requirements of the secondary crushing plant operator who communicates with him by phone. The main conveyor is 36 in. wide and has a center-to-center distance of 981 ft. It is built on two slopes, the incline from the tail pulley for about 30 ft is 12½° which facilitates the loading of the belt. The balance of its length is at 17½°. The total lift to the secondary crushing plant is 293 ft. Belt speed is 284 fpm and requires 65 hp.

Electrically Interlocked

There are three features in the installation which assist in maintaining a smooth and continuous operation. The pan feeder, primary conveyor and secondary crushing plant are electrically interlocked to avoid spills and possible damage to equipment. An electronic metal detector is installed to stop the belt automatically when tramp iron, shovel teeth, etc., are present in the ore, thereby preventing costly damage to crushers.

As an emergency measure, a pocket at the collar of the underground shaft was built where it could be reached by the ore trucks. A loading cartridge at the bottom of this pocket discharges directly into the hoist skips and the ore is hoisted to the original coarse ore bin which was left intact with pan feeder, etc. Thus in case of a shutdown of the main belt for repairs or replacements, a continuous feed to the mill, which operates around the clock, is assured.

In summary, the following advantages were realized by the installation of the open pit conveyor:

(1) The number of mining shifts has been reduced from 21 shifts per week to 12.

(2) The cost of transporting ore to the secondary crushing plant has been drastically cut.

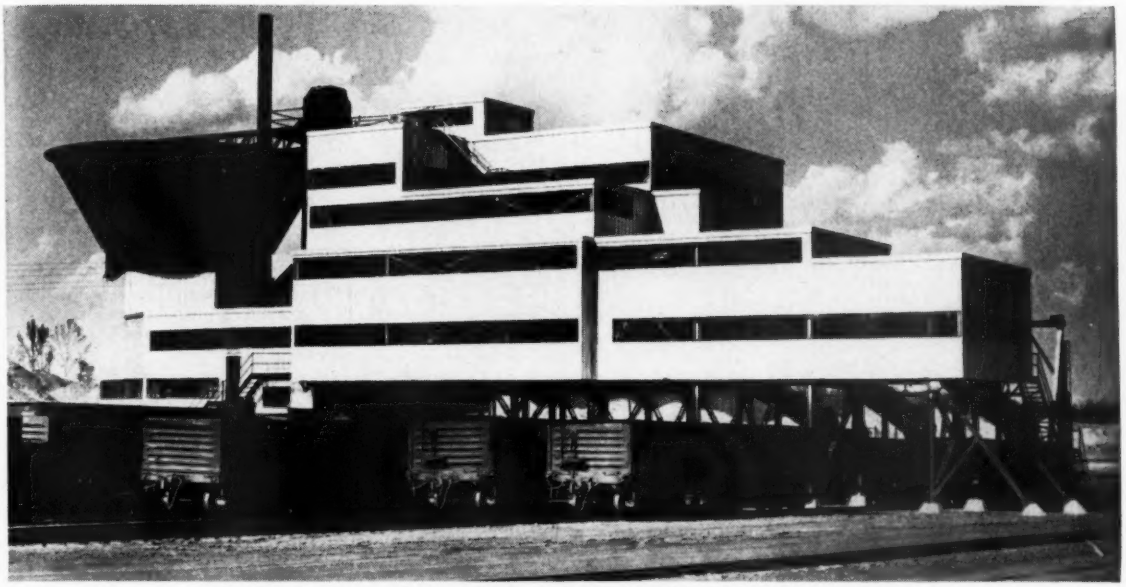
(3) Ore storage between mine and crushing plant has been multiplied five times.

(4) Another stage of crushing was provided which increased the capacity of our crushing plant, ultimately permitting the addition of another grinding section in the mill.

The production increase is most graphically indicated by the fact that the mined tonnage was increased from 682,000 tons in 1944 to 1,230,000 tons in 1953.

Ore is trucked to primary crusher in pit

A New Look at Mill Buildings



Careful attention to details produces a functional building of pleasing appearance

More Attention to Design Will Pay Off in Lower Cost, Higher Worker Morale and More Efficient Use of Space

By O. W. WALVOORD
O. W. Walvoord, Inc.

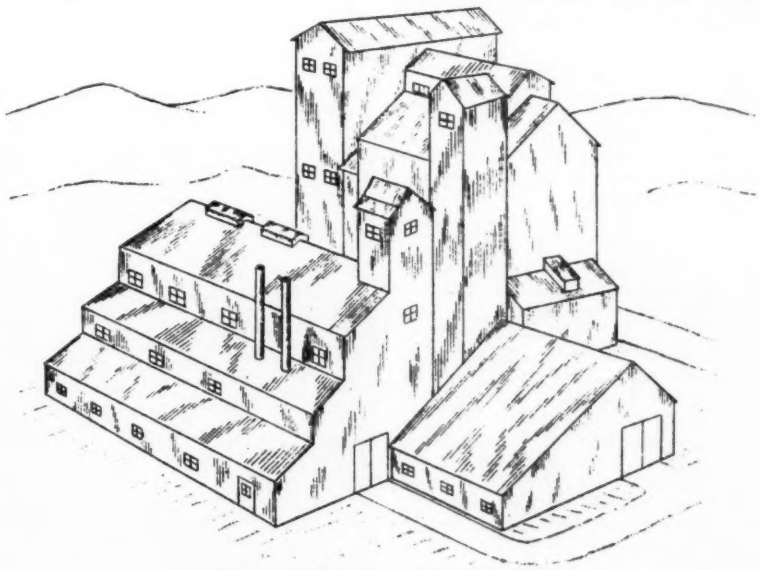
THE design of mill buildings has come a long way since the first crude shed was set over an ore-dressing machine, but much can still be done to produce buildings which are better structurally, functionally and architecturally.

During the design stage of the average mill project, the buildings are usually not given sufficient attention. A size and shape are determined from the general arrangement, stresses are calculated and an order is rushed to a fabricator to get the earliest possible delivery. To spend very much time in the investigation of materials of construction is not usually possible under such deadline circumstances.

The main purpose of a building is to shield the enclosed space from the elements, but it serves other functions. It supports cranes and machinery, stairs and platforms, electrical fixtures and conduits, piping and many other items. A building should be designed to perform these functions efficiently, but a building designed for function alone lacks something. It seems to have an uninviting appearance, a "sweat-shop" aspect, which does nothing to improve its surroundings. Just a little attention to architectural appearance plus some landscaping can do wonders for such a building. Attention to such details can also pay large dividends in the form of better morale of the workers and the development of a sense of "company pride."

Quite often, one observes a project with an attractive modern office building, while the balance of the structures are of "traditional" mill architecture. It would seem desirable on a large project to carry out a scheme of architectural planning which included all of the buildings and structures.

In the old days, the shape of mill buildings was usually a function of the



Some mills look as if they "just growed"

This 22-story building was totally enclosed with aluminum facing in less than 10-hrs by six six-man crews

topography, proximity to the mine, and the necessity of providing a gravity flowsheet. Through common usage this type of structure became known as a "mill building."

More Freedom Today

In the present, we are not so limited by these conditions. Modern earth-moving machinery can quickly and cheaply prepare a "level" site in all but the most rugged terrain; the flexibility of large dump trucks and conveyor-belt systems have moved the mill farther and farther from the mine, while cheap electricity and efficient sand pumps have made the gravity flowsheet unnecessary. As a result, the majority of modern mills are built on level or near-level sites, and their operators spend but little time in stair-climbing.

The advantages of the level site are many, and it seems worthwhile to mention a few of them here. They include a more compact arrangement of machinery, simpler foundations, more flexible flowsheet and greater opportunity for expansion.

The size of the building, usually determined from the equipment arrangement, should include facilities for material handling, parts storage, repairs, walkways, stairs and platforms. Too often the owner or designer seeks to reduce the cost of a building by limiting aisle space or machinery clearance to a bare minimum. Such economy is false, and only creates difficulties for the operating personnel. In many such cases, a future change to a slightly larger machine may necessitate very costly or unsightly modifications of the original building. Owners and designers alike are strongly urged to make their buildings large enough to perform adequately the function for which they are built.

Design for Expansion

Future expansion, the dream of most operators, is all for the good. To provide for very much expansion within a given enclosure is uneconomical, but allowances can be designed into the initial structure which will greatly reduce the cost of any future expansion. When a building is being laid out with possible expansion in mind, particular attention should be paid to the direction of roof slopes and the details of framing, and extra space should be cleared around the foundation.

The frame of most present day mill buildings is made of structural steel shapes with the use of concrete or wood frames falling far behind. The use of shop welding and field assembly with high tension bolts is gaining in favor, while rivets are used by an ever-lessening number of fabricators.

Prefabs are satisfactory for accessory structures, but generally cannot be adapted to suit the unusual shape requirements of most mill buildings. It should be kept in mind that prefabs are designed to meet minimum loading specifications and cannot be depended upon to sustain unusual loadings.

The conventional truss-and-column frame is widely used in multispan mill buildings, while rigid frame bents are becoming quite popular in large, single-span structures. One disadvantage of the rigid frame bent, where no crane is provided, is the absence of any truss members from which rigging can be hung for dismantling or repair work.

Sloping or Flat Roof?

The sloping roof is still the first choice of most designers and will probably remain so, as long as corrugated roof sheets are used. However, it appears that the angle of slope is less than in former years.

Steep roof slopes of the past may have been employed in the belief that the snow would more readily slide from such a surface. Some snow will not slide regardless of the roof pitch, and it is better to keep the snow on the roof than to dump it on workers below. Falling snow and ice cause much damage and the designer would do well to place building entrances clear of this hazard.

The prevention of the formation of icicles on building eaves remains an unsolved problem. Various methods of applying heat to melt the ice has met with little success. This problem should be a challenge to the operators, as they have the means by which to find the answer.

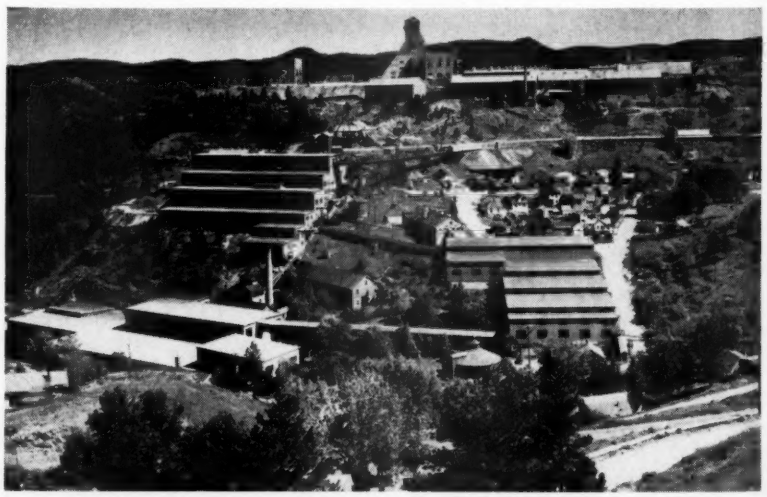
Flat roofs have yet to find their place in mill buildings, but they are being used extensively on mining and milling plant accessory buildings. The flat roof readily permits future building expansion in any direction without regard for roof slope and with a minimum of framing problems.

Walls Will Change

Walls of mill buildings have seen little change in a number of years. One not-too-recent advancement is the use of a smooth wall outside of the girts and a smooth wall inside the girts. This arrangement provides a better interior appearance by concealing the girts and wall bracing from view and reducing the areas in which dust can collect.

Prefabricated sandwich-type wall sections, consisting of two sheets of metal separated by insulation, are becoming more popular. Unfortunately, their selling price is still too high to be offset by their reduced erection cost.

It is predicted, however, that within a short period of time, mill buildings will be using "curtain-wall pre-



When gravity flow sheets were the rule a hillside was the place to build

assembled insulated panels." Recently, a 22-story office building in New York was totally enclosed with aluminum facing in less than 10 hr. A total of 676 panels, measuring 4½ ft by 23 ft by ⅛ in. in thickness and weighing 200 lb each were placed by six six-man crews.

Prestressed Concrete

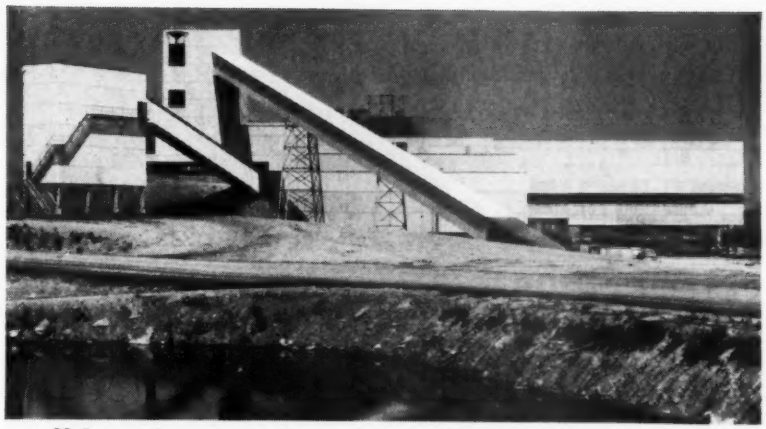
Prestressed concrete was first developed about 1886; however, its accepted use in the United States was not until about 1949. In beam and girder construction it is now competitive with steel or wood truss roof systems. Its advantages over reinforced concrete are control of deflection, crack-free concrete, greater elasticity and increased head room. Probably the use of prestressed concrete mill buildings is closer than most of us realize.

Use of windows in mill buildings and, in fact, in a lot of other industrial buildings, is a very controversial subject. The present trend is toward the use of "many or none." The usefulness, initial cost and maintenance of windows should be considered along with the climate and location of the building. A recent development of interest is the translucent fibreglass panel, shaped to match corrugated cover, and suitable for use in the walls or roof.

Heat, ventilation and insulation should all be considered in designing a building. Heating can be accomplished by the use of a central heating plant or individual units. Warm-air heaters seem to be replacing steam largely due to their lower initial cost, operating economy, greater flexibility and better heat distribution. Ventilation requirements are varied, and should be carefully considered if sources of heat or noxious odors are contained within the building. Insulation is becoming a justifiable expenditure with heating-fuel costs on the rise. In many cases, the more comfortable working conditions make insulation a must.

Fire Protection

The danger of fire, a threat to any structure, is increased many times for mill buildings because of their remote or isolated locations. It is very desirable, therefore, that a mill building be made as fireproof as possible. The use of incombustible construction materials is not in itself sufficient; for by insurance standards a building may have a framework of structural steel and roofing and siding of galvanized iron sheets and still not be classified as fireproof. Attention must also be given to such items as the materials which will be stored in the building, the operating process, the adequacy of the fire protection system and the proximity of other structures. Insurance rates which are based on all of the preceding considerations can be kept comparatively reasonable in cost by meeting certain minimum requirements.



Modern earth moving machines make a level site possible almost anywhere

Color and Safety

The effect of color on human behavior has been the subject of considerable study, and we are aware today that it can have great influence on efficiency and productivity. In many industrial plants this new technique, called "color dynamics," has been used effectively to reduce accidents and improve worker morale.

Mill building costs are a function of the cost of materials and labor, as well as the size, shape and permanency of the structure. The designer and owner thus have some selection of these items, which ultimately affect the total cost.

In the selection of the proper materials, due consideration must be given to the appearance, first cost and yearly maintenance, permanence and the amount of labor required for its erection.

Labor cost of materials is rising because wages are going up, while labor productivity is going down. This trend can be partly offset by the use of more mass produced, large size panels, along with mobile crane erection and electric hand tools. On this point the materials manufacturer should strive for simpler details, more standardization and better distribution to lower transportation costs.

The size and especially the shape of a building have a definite relation to its cost. A building with smooth lines and few projections will cost less.

In the more temperate climates, consideration should be given to the partial elimination of buildings. This has been done with success in the field of chemical plant construction.

This thought of partial elimination of a building is much more feasible now than it was only a few years ago. Good progress has been made with automatic controls, which in turn has reduced labor requirements. Electric motors do not require a housing and the wiring can be made weather tight. Crane service can be achieved with a mobile unit. All of which sums up so that there is less need and use for buildings under certain circumstances.

Conclusion

If this article makes the design of a mill building sound difficult and complex, then it has achieved its purpose. It is no easy task a develop a structure that will effectively perform all of its intended functions and still look like something. The past is filled with mills which have grown haphazard. The present finds most mills structurally and functionally adequate but lacking much in architecture. Let's try to fill the future with mills which give evidence of planning and apply modern materials and techniques to help lower costs and make operating more pleasant.

"You've got to give my husband a raise—he needs it badly!"

Wheels of GOVERNMENT

AMC

As Viewed by HARRY L. MOFFETT of the American Mining Congress

CONGRESSIONAL leaders, while still driving for an August 1 adjournment, fear that legislative tangles may develop over a number of major issues and prolong the session until mid-August.

Remaining on the "must" list of bills are a number of controversial measures including a hike in the minimum wage, Social Security changes, housing, a broad scale military reserve program, foreign aid, and a long range highway construction plan.

Appropriations measures, usually the key to adjournment, are making good headway. Out of a total of 13 major money measures for the 1956 fiscal year, five have been sent to the White House, five are in conference between House and Senate and will probably be sent the President shortly, one has been approved by the House and is pending in the Senate, and two are still before the House Appropriations Committee.

New Trade Law

The President has signed the measure extending the Trade Agreements Act for three years and empowering him to cut tariffs up to five percent in each of these three years.

The new law also authorizes the President to restrict imports through higher tariffs or import quotas when necessary to afford protection to industries essential to national defense. It also (1) provides that a domestic industry, to be eligible for relief under the "escape clause," must prove only that increased imports resulting from tariff cuts have "contributed substantially toward causing or threatening serious injury to such industries," (2) requires the U. S. Tariff Commission, in cases where a business enterprise involves more than one industry, to distinguish or separate the operations of such an enterprise for purposes of determining injury, and (3) requires that the Tariff Commission's "escape clause" recommendations to the President be made public immediately.

In signing the measure on June 21, the President termed it "a significant milestone" in the nation's foreign policy.

Immediately after the new law was approved, a Committee for the American Fluorspar Producers filed an application with the Office of Defense Mobilization urging imposition of an import quota limitation on fluorspar, and requesting a public hearing in which the industry may present testimony to show need for the import curb. This is the first such request made of ODM under the "national security" provision of the new law.

Tax Changes

The President has approved a bill repealing retroactively Sections 452 and 462 of the Internal Revenue Code, which had permitted accrual-basis taxpayers to defer paying taxes on advance payments as income until the year or years in which the income is earned, and to deduct reasonable additions to reserves for estimated future expenses.

Two import tax suspension measures have likewise become law during the past month. The present suspension of the two cents-a-pound import duty on copper will be continued through June 30, 1956, with the requirement that the tax be reimposed if the average price for copper falls below 24 cents a pound in any one calendar month. Also extended until June 30, 1956, was the suspension of import duties on nonferrous metal scrap except lead and zinc scrap.

Elsewhere on the fiscal front, Congress moved with rapidity to approve a year's extension of the $281 billion debt limit. The debt limit was scheduled to return to its permanent $275 billion level on June 30, but pleas by the Administration for a continuation of the $281 billion figure for another year were quickly heeded by the solons.

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Washington Highlights

TRADE ACT: New law signed.
TAXES: President approves changes.
RENEGOTIATION: Act extended.
NATURAL GAS: Legislation pending.
WATER POLLUTION: Control Act broadened.
DEFENSE PRODUCTION ACT: Two-year extension voted.
MINING LAW: Revisions approved.

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Renegotiation Act Extended

In conference between House and Senate is a measure to extend and modify the Renegotiation Act covering defense contracts. The House had approved continuation of the Act last April and the Senate finally acted upon the bill on June 21.

In the Senate the bill was amended to provide for an extension to December 31, 1956, and to (1) exempt from renegotiation contractors and subcontractors of "standard commercial services," (2) exempt from renegotiation construction contracts made by competitive bid except for military housing contracts for military personnel, (3) extend exemption to persons selling new durable productive equipment for incorporation in equipment sold to the Federal Government (4) permit the Renegotiation Board to review renegotiated contracts in which inequities had occurred and to consider the profits and losses of the contractor over a period of years, and (5) direct the Joint Committee on Internal Revenue Taxation to report by May 31, 1956, whether the Act should be extended further or be limited to specific items.

The measure will continue the $500,000 minimum amount subject to renegotiation and will make no change

in the mandatory exemption of mineral raw materials which have not been "processed, refined or treated beyond the first form or state suitable for industrial use."

It is expected that the minor differences between the House and Senate versions will quickly be ironed out and the final bill sent to the White House.

Natural Gas Legislation

Natural gas legislation is making progress in both the Senate and House but what shape any bill may finally take is still a question. House Speaker Sam Rayburn (Dem., Tex.) has predicted that a bill to exempt natural gas producers from Federal regulation would be approved this year, but he said that it would be necessary for the President to endorse such a measure if it were to become law.

The House Interstate and Foreign Commerce Committee, by a one-vote margin (16-15), has reported the Harris bill which would exempt individual producers of natural gas from jurisdiction of the Federal Power Commission. The Committee voted down proposals which would have given the FPC authority over direct sales of natural gas to industrial consumers, and which would have made it mandatory that the FPC consider sound principles of conservation in administering the Act—as contained in the Staggers bill. It is expected that the bill as reported will be subject of House debate in the near future.

The Senate Commerce Committee has held hearings on natural gas measures and has also approved a measure essentially the same as the Harris bill. During the hearings Rolla D. Campbell, general counsel, Island Creek Coal Co., urged the adoption of the Kilgore bill which would give the FPC jurisdiction over direct sales of natural gas to industrial consumers. Campbell told the Committee that use of natural gas has increased under Government policies which have favored the gas industry to the detriment of the coal industry. He called for a strong and definite policy for conservation of natural gas, declaring that gas reserves are limited to 22½ years. He also pointed out that the Cabinet Committee on Energy Supplies had strongly urged the adoption of a policy to maintain coal production capacity at a level adequate for national defense purposes.

James D. Francis, president, Powellton Coal Co., suggested that Congress consider making the natural gas interstate transportation lines common carriers with the same privileges, rights, and duties that the railroads have with respect to the shippers and receivers of goods by rail.

Water Pollution

A bill to extend and broaden the Water Pollution Control Act and to authorize $2,000,000 annually for its operation has been passed by the Senate and is pending in the House.

The measure would require the Federal Government to encourage cooperative activities by the States in the prevention and control of water pollution and to conduct research into water pollution matters. It would authorize the Surgeon General to make grants-in-aid to public or private agencies and to institutions and individuals for the conduct of research or training projects, and to establish and maintain research fellowships in the Public Health Service.

The Senate bill would also provide for encouragement to the States to enact uniform laws for the prevention and control of water pollution. The U. S. Attorney General would be empowered to bring suit on behalf of the United States to effect water pollution abatement in interstate waters after the Surgeon General had given the parties involved a proper notice and time to effect abatement, and after a full hearing had been held. This procedure would take about nine months before suit could be entered.

It is expected that the legislation will be approved by this Congress.

Defense Production Act

The Senate Banking and Currency Committee has approved a two-year extension of the Defense Production Act, which is due to expire June 30. Meanwhile, Congress has approved an emergency measure extending the Act for one month to permit more time for consideration of the two-year proposal.

As reported by the Senate Committee, the priorities and allocations powers granted the President under the Act would be the same as now in effect. It would also continue until June 30, 1957, the Executive's powers to allocate scarce materials and to encourage domestic production of metals and other critical items through direct purchase, loans and loan guarantees. It is on this latter provision that activities of the Defense Minerals Exploration Administration and certain metal and mineral purchase programs are based.

The measure would also give the President more authority than he now has to promote development of substitutes for critical materials not available in adequate quantities to meet war demands.

It also contains approval of the "executive reserve" program under which business men are being recruited to serve without compensation in case of another national emergency. Members of this reserve would be prohibited from serving in policy-making jobs and from handling Government matters in which their industrial concerns have an interest.

Early approval is expected of the measure.

Mining Law Revision

The House, by a unanimous vote, has written its okay to legislation by Rep. Rogers (Dem., Tex.) to revise the mining laws so as to eliminate abuses of those laws without disturbing the basic principles involved.

Carrying the ball on the House floor, Chairman Clair Engle (Dem., Calif.) of the House Interior Committee made it plain that abuses of the mining laws had made necessary the enactment of legislation to eliminate the filing of "phony" claims and to provide a procedure under which the Federal Government may clear up title uncertainties resulting from thousands of "stale and dormant mining claims" throughout the public domain.

Meanwhile, the Senate Interior Committee sent a companion measure by Senators Anderson (Dem., N. Mex.), Aiken (Rep., Vt.), Barrett (Rep., Wyo.), Bennett (Rep., Utah), and Watkins (Rep., Utah) to the floor. In reporting the measure the Committee said that the purpose of the bill "is to permit multiple use of the surface resources of our public lands, to provide for their more efficient administration, and to amend the mining laws to curtail abuses of those laws by a few individuals who usually are not miners." It carefully pointed out that the measure safeguards all of the rights and interests of bona fide prospectors and mine operators, and declared that the bill would in no way "deprive them of rights and means for development of the mineral resources of the public lands of the United States under the historic principles of free enterprise and private ownership of the present mining laws."

The Committee also made it clear that the authority which would be given to the United States to manage surface resources on unpatented mining claims would be limited "in specific terms to those activities which do not endanger or materially interfere with mining operations or related activities; it is the intent of the proposed legislation that mineral resource development shall remain the dominant use of lands under mining claims."

Senator George W. Malone (Rep., Nev.) filed minority views on the bill opposing many of its provisions and recommending that it be applied only to forest areas. He proposed such an amendment on the Senate floor but it was soundly defeated.

The bill was approved by the Senate in late June. It is expected that differences between the Senate and House versions will be resolved promptly by a conference committee and the bill sent to the White House. Since the Budget Bureau has placed its stamp of approval on the measure it is probable that the President will affix his signature at an early date.

AMC Personals

Three new directors have been appointed to the Board of the Northwest Lead Co., Seattle. They are: **Harold E. Lee**, general superintendent of Bunker Hill smelter, Kellogg, Idaho; **Wallace G. Woolf**, manager of Sullivan Mining Co., Silver King, Idaho; and **H. P. Lawrence**, vice-president of Northwest Lead Co.

Cornelius F. Kelley has retired as chairman of the Board of Directors of the Anaconda Co., formerly Anaconda Copper Mining Co. His resignation on May 18 climaxed 54 years with the company, including 15 years as chairman and 22 years as president. Kelley joined Anaconda in 1901 and seven years later became its general counsel. He will continue as a director.

C. F. Kelley

Roy H. Glover

Succeeding Kelley as chairman of the Board of Anaconda is **Roy H. Glover.** Glover has been vice-president, general counsel and a director of Anaconda and two affiliates. He joined the company in 1943. Earlier this year the president of Chile presented him with a special award for service to that country.

Harry W. Bradbury has been elected president of Lehigh Valley Coal Co., Kingston, Pa. Bradbury has been executive vice-president of the company, which has been without a president since it was taken over by New England Industries, Inc., **L. R. Close**, president for many years, resigned at that time.

Robert G. Kenly has been elected a vice-president of The New Jersey Zinc Co. He has been vice-president of The New Jersey Zinc Sales Co. since 1951 and will continue to supervise the activities of that unit.

Herman Knight has resigned as general superintendent of the West Kentucky mines of the Bell & Zoller Coal Co. to go into uranium mining in the West. He has been succeeded by **Eugene T. Moroni.**

George Price, superintendent of mills for the American Smelting & Refining Co. in the Mullan, Idaho, district since 1934, retired April 30 after nearly 39 years of service with Asarco. He has been succeeded as superintendent by **George Deshler.**

Oscar C. Mueller, long associated with the Conveyor Committee of the American Mining Congress Coal Division, recently celebrated 50 years of continuous service with one company. Mueller, who is now manager of the Pittsburgh office for The B. F. Goodrich Co., Industrial Products Division, joined that company in 1905 as a clerk-messenger at the age of 15.

American Potash & Chemical Corp. has announced the transfer of two men from the company's main plant at Trona, Calif., to the American Lithium Chemicals, Inc., plant at San Antonio, Tex. **George T. Deck**, technical director at Trona, has been named plant manager at San Antonio. **A. J. Carrodo** has been named personnel and office manager. American Lithium .Chemicals, Inc. is partly owned by American Potash.

F. P. Kerr has been appointed superintendent of Sarah Ann No. 4 mine of Crystal Block Coal & Coke Co. at Sarah Ann, Logan County, W. Va.

Robert E. Dwyer, president of Anaconda Co., has announced two important changes in the company's operating personnel in South America. **Charles M. Brinkerhoff** is now general manager of South American operations, and **Norbert F. Koepel**, assistant general manager of South American operations for Anaconda and its subsidiaries. Brinkerhoff will be in charge of operations of Chile Exploration Co., Andes Copper Mining Co. and other Anaconda properties in Chile with headquarters at Chuquicamata. Koepel will maintain his headquarters at Potrerillos.

Aluminum Co. of America has elected **Edward B. Wilber**, treasurer. Wilber succeeds the late Gordon W. Cameron.

Robert H. Ramsey, formerly editor of *Engineering & Mining Journal*, was elected secretary of the St. Joseph Lead Co. at a meeting of the Board of Directors on May 9. He replaces Robert Bennett who retired on that day after 49 years' service with the company.

James G. Colvin, former assistant secretary and assistant treasurer, was elected comptroller and assistant treasurer at the same meeting and **William J. Eliott** was elected assistant secretary. **Edward P. Merrell** was also elected assistant treasurer.

The retirement of **James H. Elliott** as secretary of Calumet & Hecla, Inc. under the company's retirement plan, has been announced by Endicott R. Lovell, president.

Albert E. Petermann, vice-president and general counsel for the corporation takes over Elliott's duties. Mr. Petermann will be assisted by **William E. Haines**, assistant treasurer, who assumes the position of assistant secretary.

Other executive changes include the naming of **Colin J. Andrews**, corporate accounting manager, to assistant treasurer, and **John Rohrbough** to corporate accounting manager.

On July 1, **E. C. Weichel**, vice-president of the Hudson Coal Co. and member of the Anthracite Board of Conciliation, retired from active affiliation with the industry. Weichel has been identified with the coal industry in various capacities for 52 years, having started to work in the engineering department of the Pennsylvania Coal Co. in 1903. He became associated with Hudson in 1923 as mining engineer and was elected vice-president in 1950.

E. C. Weichel

Vernon L. Mattson, formerly director of the research institute at the Colorado School of Mines in Golden, Colo., has been named to the newly-created position of manager of mining and ore processing for Kerr-McGee Oil Industries, Inc.

John S. Wells has been appointed manager of the High Volatile Division mines of Eastern Gas & Fuel Associates to succeed the late W. D. Hawley. Wells, who joined the firm in 1930, was promoted from production engineer for the division to manager effective May 1.

George R. Beehler, general manager of Glen Alden Corp., was elected a member of the Anthracite Board of Conciliation to represent producers in District 1. He succeeds **E. C. Weichel.** Beehler has been general manager of Glen Alden Corp. since December 1953 and has been associated with Glen Alden since 1922.

Glen J. Christner, vice-president of the Eagle-Picher Co., has announced the appointment of **Pascal M. Rapier** to the post of process engineer at the company's Clark, Nev., plant, where "Celatom," Eagle-Picher's diatomaceous silica, is processed.

The Indiana Coal Association has announced the appointment of **Julian E. Tobey, Jr.** as director of engineering with headquarters at Terre Haute, Ind. In this position, Tobey's efforts will be directed toward the development of a broader market for Indiana coals through engineering advisory service to consumers and prospective users of bituminous coal and through collaboration with consulting engineers, architects, research organizations and manufacturers of combustion equipment.

For the past five years, Tobey has been associated with Blue Diamond Coal Co., Cincinnati, Ohio, as industrial sales engineer. Prior to his connection with Blue Diamond, he was employed as a research engineer, Fuels Division, Battelle Memorial Institute, Columbus, Ohio.

Emmett J. Norris, credit manager and assistant treasurer of Calaveras Cement Co., recently was presented with a gold watch in honor of his completion of 25 years of service with the company.

The presentation was made by Calaveras President William Wallace Mein, Jr.

Norris began with Calaveras as an accounting clerk in 1930, advancing to chief accountant and then to assistant treasurer. He was the company's enrollee in the executive development program of the Stanford University School of Business last year.

CORRECTION

Mining Congress Journal apologizes for its error on this page last month. The item concerning election of officers of the American Zinc Institute should have shown that the new Institute president F. S. Mulock is also president of U. S. Smelting Refining & Mining Co. Erle V. Daveler, American Zinc, Lead and Smelting Co., was elected treasurer.

— *Obituaries* —

Howard R. Huston, 62, retired vice-president and director of American Cyanamid Co., died suddenly June 8 at his summer home at Truro, Mass.

Mr. Huston retired from his Cyanamid post May 30. He had achieved prominence in industrial and diplomatic circles. He joined Cyanamid in 1930 as assistant to the president. He was elected vice-president in 1951, and a director in 1952.

Mr. Huston directed Cyanamid's activities in the fields of public relations and institutional advertising, which he pioneered in the mid-30's. He was also in charge of personnel administration and employe relations. He was active in numerous industrial organizations, including the American Mining Congress, and the National Association of Manufacturers.

Before joining Cyanamid, Mr. Huston was a member of the Secretariat of the League of Nations, a post to which he was appointed in 1919 by President Woodrow Wilson. He was a member of the Secretariat of the Conference on Naval Armament between Great Britain, Japan and the U. S.

In 1946 he was advisor to the committee which chose the present site of the United Nations. In 1948 he was named a delegate to represent industry on the Chemical Industry Committee of the International Labor Office.

John Daniel Wallace, 45, mine inspector for the West Kentucky Coal Co., died March 30 in Madisonville, Ky. He had been ill two days.

Harry L. Moat, 58, director of production for the Atlas Powder Company's Explosives Department, died suddenly at his home in Wilmington, Del., on June 12.

A native of Catasaqua, Pa., Mr. Moat was graduated in 1918 from Pennsylvania State College. He started with Atlas the same year at the company's explosives experimental laboratory. In 1919, he became chief chemist of the Forcite Works, Landing, N. J. The following year he was transferred to Reynolds Works, near Tamaqua, Pa., where he held a series of supervisory posts.

Mr. Moat came to Wilmington in 1931 to serve on the Explosives Department staff in the Atlas General Office. He had been director of production since November 1954.

Walter Bernard Kreis, 60, died in Johnson City, Tenn., April 24.

Mr. Kreis had operated mines in Letcher and Perry Counties in Kentucky. He moved to the state in 1925 as store manager at the Marion Coal Co. at Blackley, Ky. Later he operated a number of truck coal mines and after that moved to Kona, Ky., where he was employed by the Elkhorn Coal Co.

Otto F. Hodgdon, 67, retired mining engineer, died in Miami, Okla., April 20. Mr. Hodgdon had been long associated with lead and zinc mining in the Tri-State area. The last 16 years of his mining career were spent with Eagle Picher Co. He retired in 1953.

Robert C. Woodward, 68, died on April 20 after a short illness.

Mr. Woodward retired from Bucyrus-Erie Co. only last December to enter consulting practice. A nationally known authority on drilling problems, he was the author of a recent paper on "Heating, Forging and Hardening Churn Drill Bits." During his 20-year association with Bucyrus-Erie, he had a number of "firsts" in cable tool drilling to his credit. He was the originator of the light weight cast steel tool wrench; first to use alloy steel for blast hole churn drill bits and originator of the "deep quench" method for tempering bits.

Charles A. Pratt, senior vice-president, Goodman Mfg. Co., died recently at his home in Evanston, Ill. With Goodman since 1904, Mr. Pratt became a vice-president in 1918 and was a director for 31 years. He had been in semi-retirement for the past several years although he continued to act in a consulting capacity.

James Farley McClelland, 77, died on May 6 at his home in Greenwich, Conn. He was a retired vice-president and director of Phelps Dodge Corp.

William Willard Taylor, 83, retired mining engineer, died at his home in Signal Mountain, Tenn., May 25.

A native of Lapeer, Mich., Mr. Taylor was graduated from the University of Michigan in 1893 with a B.Sc. degree in engineering. He turned his talents towards the iron and steel industry and was considered an expert on blast furnace practice.

Program Committee took time out for lunch

Program Set for Las Vegas

National Committee Meets to Formulate Agenda for Big Fall Meeting

ON Tuesday, June 21, local, state and district chairmen of the Program Committee met at the Thunderbird Hotel in Las Vegas to select topics and speakers for the American Mining Congress 1955 Metal Mining and Industrial Minerals Convention. Some 2000 to 3000 mining men and their ladies are expected to gather in this colorful Nevada city for the big event October 10-13.

National Chairman L. J. Randall, president, Hecla Mining Co., called the 26-man meeting to order at 9:45 a. m. Except for a brief intermission for lunch the entire group of state and district chairmen and local program committee members spent the entire day on the task of formulating a comprehensive, well-rounded program.

Using as a starting point a summarized list of the suggestions sent in by more than 180 committee members and interested mining men from all over the United States and Canada, the committee decided on a full schedule of sessions dealing with national policies affecting mining, operating developments in underground and pit mining, milling and metallurgy, exploration and geology, industrial minerals, gold and silver, and the many problems of the uranium industry. A Welcoming Luncheon will be held on Monday and the traditional Strategic Minerals luncheon, on Tuesday.

The convention in Las Vegas will highlight government-industry relations in an effort to find the answers to major problems which mining faces. Many of the Program Committee's invitations to United States Senators and Representatives and other high Federal and State officials have already been accepted. Other invited speakers are seeking to rearrange tight schedules so that they can take part in this most important mining meeting of the year. Outstanding mining men will also take part in the proceedings, which will include discussions of the mineral industries, mining and national defense, labor and management relations, public relations of the industry, public lands, tariffs, taxation, stockpiling and Government minerals policies, etc.

Leading operating men and AEC officials will contribute to the program

Giant wartime Basic Magnesium plant at Henderson houses five big plants

Arrangement Committees

Roy A. Hardy

Hewitt S. West

Louis D. Gordon

Roy A. Hardy and Hewitt S. West are co-chairmen of Arrangements Committee—Louis D. Gordon is vice-chairman

L. J. Randall called meeting of Program Committee chairmen

F. A. McGonigle

Joseph W. Wells

F. A. McGonigle is arranging field trips for October 13; Joseph W. Wells is publicity chairman

(Photo Not Available)

Mrs. Joseph W. Wells

Mrs. Hewitt S. West

Mrs. Hewitt S. West and Mrs. Joseph W. Wells, co-chairmen Ladies' Hospitality Committee, will greet visiting ladies

with addresses and papers on the exploration, mining and milling of uranium ores as well as the whole question of industry-government relations in this dynamic segment of the mining industry.

At other sessions dealing with the metal mining and industrial minerals industries, experienced operators will present new developments in methods and equipment for meeting difficult problems in exploration, mining and metallurgical treatment.

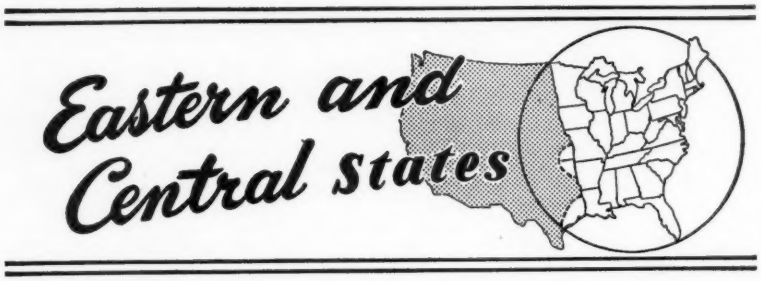
The milling sessions have been designed to dovetail with the program of the AIME Rocky Mountain Minerals Conference in Salt Lake City October 5 to 8. Many of those attending the AIME meeting will board the train in Salt Lake on Sunday morning, October 9, arriving in Las Vegas that afternoon, to get double value out of their trip by attending both meetings.

The ladies who plan to come to Las Vegas can look forward to the special parties being arranged for them. First, there will be an outdoor luncheon Monday at the Hotel Riveria in the patio overlooking the swimming pool. On Tuesday they can "Brunch" in the Congo Room of the Sahara Hotel, followed by a jeans-to-formal style show. On Wednesday they will have an opportunity to visit Lake Mead and the mighty Hoover Dam, with a trip through the huge structure to see how the Colorado's energy is bent to man's services.

Frontier Village—a typical old-time western town—will be the scene of the barbecue and Western Party on Monday night. This will be the only official AMC entertainment function of the convention. The rest of the week has been left open so convention-goers can take full advantage of all the entertainment, fun and excitement that Las Vegas has to offer. Special provision will be made so mining folk can make reservations for any or all of the top flight shows at the gay resort hotels.

For Thursday of convention week, two trips have been arranged. On one, visitors will see the Three Kids mine and the plant of Manganese Inc. as well as the operations of Western Electrochemical Co. and U. S. Lime Products Corp. at Henderson, Nev. Those who go on the other trip will see the Molybdenum Corporation of America's famous mine and mill at Mountain Pass, Calif., where rare earths are mined and treated.

Requests for accommodations at the fine hotels on Las Vegas' "Strip" should be addressed to the Las Vegas Housing Committee, Care Las Vegas Resort Hotels Association, P. O. Box 1750, Las Vegas, Nev. There are also numerous excellent motels, reservations for which may be obtained by writing Fred Ellis, Sr., president, Las Vegas Motels Association, 22217 Fremont St., Las Vegas, Nev.



Ship Marmora Iron

Official opening of Bethlehem Steel Co.'s iron mine at Marmora, Ontario, took place May 11. The occasion also marked the first shipment of concentrate from the dock at Picton to the company's blast furnaces at Lackawanna, N. Y., just outside Buffalo.

Will Pipe Coal in Ohio

Elmer L. Lindseth, president of Cleveland Electric Illuminating Co., and George H. Love, president of Pittsburgh Consolidation Coal Co., announced May 31 that their companies had entered into a contract for the delivery of approximately 18,000,000 tons of coal over a 15-year period by means of a coal pipeline extending from the coal company's Georgetown, Ohio, properties to the Eastlake, Ohio, plant of the Cleveland Electric Illuminating Co., a distance of 108 miles.

Love stated that this will be the first commercial coal pipeline in the United States and is being constructed with the complete cooperation of the two railroads serving the mine and the one railroad upon which the utility plant is located. The New York Central Railroad, the New York, Chicago and St. Louis Railroad (Nickel Plate) and The Pennsylvania Railroad are participating with the coal company. These railroads are in a position to take a substantial ownership in this new means of coal transportation when construction is completed.

The Georgetown property, one of the largest commercial coal operations in the world, will continue to ship most of its production by rail.

Coal Troubles Behind Iron Curtain

Deliveries of lime instead of coal are drawing angry complaints from people in Soviet satellite countries, according to Iron Curtain press reports broadcast by the U. S. Information Agency.

In a world-wide broadcast, the Information Agency's Voice of America said that Hungarian and Bulgarian newspapers are reporting sharp drops in coal output as well as a deterioration in quality. Said the Voice:

"The Bulgarian newspaper, *Vecherni Noviny*, says that Bulgarian coal is of 'poor quality and mixed with earth and stones.' The statement was made in an open letter to the director of the 'September Seventh' pit at Dimitrovo. The message, written by a 'group of inhabitants of Gorno Bana,' stated that the pit had started delivering 'tons of lime' instead of coal. It pointed out that coal dust can be 'dampened, wrapped in a newspaper and burned somehow,' but, the letter asked, what can we do with the lime which we get instead of coal?"

The Information Agency broadcast pointed out that similar complaints have appeared in the Hungarian Communist Party newspaper, *Szabad Nep*, which recently reported that a number of mines had failed to reach their target figures. The Voice said: "Another Hungarian paper, *Tarsdalmi Szemle*, complained that 'the quality of coal we are producing is dropping from year to year.' The Party publication disclosed that in 1938 'lignite made up 5.4 percent and poor quality brown coal 44.7 percent of our total production.' By 1953, however, the paper said, 'the lignite percentage had risen to 14 percent and the poor quality brown coal to 57 percent.' The paper added that the average caloric value of coal had dropped from 4200 in 1938 to 3390 for the current output."

Cement Plant Expansion

The General Portland Cement Co., with main offices in Chicago, disclosed in its annual report that company projects, now under construction and planned, are expected to require capital expenditures of approximately $5,000,000 in 1955.

Part of these expenditures will be for the current construction program at the company's new Dallas, Tex., plant. A 425-ft kiln will be installed with additional grinding and other facilities. With completion expected in mid-1955, the program, it is estimated, will double the annual productive capacity of this plant, from 1,250,000 bbl of cement to 2,500,000 bbl.

Expenditures have also been authorized for a rehabilitation and improvement program at the Chattanooga, Tenn., plant. This program includes the development of a new quarry to provide lower cost limestone. The new quarry will be located on the Tennessee River, several miles from the plant, and the stone will be transported by water. It is expected that the quarry will be in operation late in 1955.

Other improvements at Chattanooga will involve the installation of a 425-ft kiln and auxiliary equipment. Work is expected to begin in July 1955, and will be completed in early 1956. This program will result in an increase in the productive capacity of the Chattanooga plant from approximately 1,300,000 bbl of cement per year to 1,750,000 bbl.

Prize Winners

Detroit Diesel Engine Division, General Motors Corp., has announced that the winners of its contest held at the American Mining Congress Coal Show are: First prize winner, L. H. Cowling, a metallurgist with Bethlehem Steel Co.; second prize winner was Allen G. Gilleland of Gilleland Coke Co., Brownsville, Pa. Other prize winners were John Sullivan, Syracuse, N. Y.; A. Vondrus, Cleveland, Ohio; S. A. Miller, Monongahela, Pa.; and Mrs. Lura Vogel of Brecksville, Ohio.

New W. Kentucky Coal Mine

Courtney Quirey, president of the DeKoven Coal Mining Co., announced in early June that his company will sink a new deep mine at DeKoven, Ky. It will be a slope mine, completely mechanized, and will use belt haulage. Quirey reported that the mine will have ultimate capacity of a million tons per year. It is planned to operate the mine in two shifts per day and the preparation plant a single shift.

The main slope, which will be approximately 1000 ft long, will be driven to the Kentucky No. 9 coal which is five ft thick in the area. Future plans provide for eventual mining of the No. 6 seam which is 4½ ft thick and lies some 250 ft below the No. 9 seam.

According to Quirey, a preparation plant with a capacity of 1000 tph will also be built. It will be a closed circuit plant. Facilities will be provided for loading washed coal on both rail and barges. The Illinois Central Railroad will service the mine and the barge loading facilities will be on the Ohio River.

Quirey will be in charge of operations and will be assisted by Davis Read, consulting engineer, Chicago, in the planning and operation of the mine. Doyle Whitmer will be mine engineer and Hugh Stewart, chief clerk.

Coal will be produced from properties formerly controlled by the Ohio Valley Coal Co., The Madison Coal Co. and adjacent land owners. The mine is expected to be completed and in operation by the summer of 1956. The Pittsburg & Midway Coal Co. of Chicago will be sales agent.

University of Kentucky Senior Wins Old Timers Award

Billy Tom Henshaw (left) of Henshaw, Ky., who was graduated in June from the University of Kentucky, was the winner of the Old Timers Award this year at U.K. He is pictured here with his wife and E. H. Jenks, assistant to the president of the Hanna Coal Co., Saint Clairsville, Ohio, who made the presentation

Ilmenite Plant Operating

Humphreys Gold Corp. has placed its second ilmenite concentrating plant in operation at the Highlands mine in Bradford County, Fla. The plant is virtually a twin of one which has been in operation for several years east of Starke, Fla. The new plant is located about three miles northeast of Lawtey, Fla., and has been under construction for more than a year. The first carload of refined ore was shipped in late April.

Ilmenite, an ore of titanium, is found mingled with ordinary Florida gray sand. The sand is dredged from the country-side and then piped to the concentrating plants.

NCA Education Committee

The Vocational Training and Education Committee of the National Coal Association met at the West Virginia University, Morgantown, W. Va., May 6 and 7. This was the second visit of the group to West Virginia. A previous visit was made in 1950.

Roland C. Luther, executive vice-president, Peerless Coal & Coke Co., acted as chairman in the absence of Henry C. Woods. On May 6, faculty members gave a general outline of instruction in their particular courses as applied to mining engineering education. On May 7 the committee held a session at which the reports of the previous day were discussed and additional comment was made by G. R. Spindler, director of the School of Mines. It was the consensus at the session that employers should give greater attention to the education of mining engineers. Other industries are offering greater inducements to engineers and the coal industry should take active steps to insure its own supply of future leaders.

It was voted to hold the next meeting of the group at Michigan College of Mining and Technology at Houghton, Mich., on October 7 and 8, 1955.

Anthracite Area Map

The Department of Interior has announced the preparation of a new detailed geological survey map of the Shenandoah quadrangle in the central part of the Middle Western Field of the Anthracite area of Pennsylvania. The map indicates the outcrops of the principal coal beds, location of mines, mine waste distribution and the structural geology of the Buck Mountain anthracite bed. The set of maps is issued as map C 21 in the Geological Survey's Investigation Series.

National Gypsum to Build Plant

National Gypsum Co. of Buffalo, N. Y., will build a gypsum wallboard and plaster plant in Burlington County, N. J., Melvin H. Baker, board chairman, has announced.

Baker said work will start soon and the plant should be in production within a year. It will be located on the Delaware River to enable the company to bring large cargo ships directly to the plant.

"National Gypsum is now developing the largest gypsum deposits in North America near Halifax, Nova Scotia," Baker said, "and the rock will be transported to the new plant in 15,000-ton cargo ships now under construction in Germany."

Coal Sales Firms Join Hands

The Midland Coal Corp. has acquired the assets of the Columbus Mining Sales Co. The expanded Midland Corp. will maintain offices in the old Midland quarters in the Transportation Building, Cincinnati, Ohio. Consolidation of the two sales companies was made in order to form a larger unit of same quality coal according to company spokesmen. Production to be handled by the merged companies will total 1,500,000 tons a year according to reports.

Start Big Dredging Job

Inland Steel Co. has announced the start of a five-year dredging project which will precede actual mining of iron ore from the company's property near Atikokan in western Ontario. Two giant dredges have been assembled on the site and will run night and day until some time in 1960 removing an estimated 160,000,000 cu yd of glacial silt overlying the ore at the bottom of the Falls Bay arm of Steep Rock Lake.

Both open pit and shaft mining and deep mining will be done at the property when completed. Shaft sinking is scheduled to start in three years. When in full operation, about 1969, the mine is expected to produce 3,000,000 tons, or more, of high grade iron ore annually.

Moffat Mine Sold

Zeigler Coal & Coke Co., Chicago, recently acquired the Moffat mine of the Moffat Coal Co., Sparta, Ill. It is understood that purchase agreement covered all the Moffat holdings, including a large acreage of undeveloped coal reserves north and east of the present mine.

Industrial Engineering Consultants

Fraser, Weir & Associates, Inc., have opened new offices at 20 North Wacker Drive, Chicago, as consultants in Industrial Engineering, with special emphasis on installation of controlled maintenance systems for all types of mining, industrial and transportation facilities. The services and techniques offered by this company were developed by H. H. Fraser and Associates Ltd. of South Africa, who have successfully introduced these methods of engineered maintenance into the mines, plants, factories and shops of a wide variety of clients in Africa and the Near East. Now affiliated with the Paul Weir Co., well-known mining consultants, these engineering services are available through the new organization to all industries, both in the U. S. and abroad.

U. S. Sells Godwin Phosphate Plant

TVA Godwin phosphate plant at Columbia, Tenn., recently purchased by International Minerals & Chemical Corp.

International Minerals & Chemical Corp. has completed negotiations for the purchase of the TVA Godwin phosphate plant at Columbia, Tenn., and will expand its production of phosphate rock in that area, Louis Ware, International's president, has announced.

The TVA Godwin plant was built by the government in 1942. It is being purchased for $635,000 as a result of a competitive bid in that amount by International Minerals. The closing date for the sale has been set for August 1, 1955, but International will be allowed to begin renovating the plant earlier in order to achieve full operations by the end of the year.

Under the terms of the sale, International will acquire 406 acres of land, 1.7 miles of railroad siding and all the Godwin plant and equipment.

After rehabilitation, which is expected to cost approximately $750,000, the plant will process about 3000 tons of ore per day from extensive reserves in the immediate vicinity.

International Minerals has been contemplating an increase in its operations in the Tennessee area for some time, Mr. Ware stated, and the Godwin plant is being acquired "to mine and process phosphate rock to meet our increasing sales requirements." The first units to be reactivated will be the mining and washing plants, followed by the drying and grinding. The first products to be produced will be wet phosphate rock for electric furnace trade, dried phosphate rock for acidulation in fertilizer processing, and finely ground phosphate rock for direct application to the soil.

Peabody Acquires Sinclair

Directors of the Peabody Coal Co. recently announced that they have authorized acquisition of the Sinclair group of coal companies. The companies to be acquired, contingent upon approval by holders of 80 percent of the outstanding shares, are: Sentry Royalty Co., Power Coal Co., Homestead Coal Co., Sinclair Coal Co., Key Coal Co., Broken Aro Coal Co., Alston Coal Co., and Sinclair Mines, Inc.

Peabody operates mines in Illinois and near the Kentucky-Virginia border. The Sinclair group operates strip mines in Ohio, Kentucky, Indiana, Illinois, Missouri and Oklahoma. Following the merger with the Sinclair group, Peabody will become a major producer for the Middle West. With reserves of approximately 1,700,000,000 tons of economically minable coal, production is expected to run from 20,000,000 to 25,000,000 tons a year.

Western States

CF&I Coal Mines Win Honors

Three Colorado Fuel and Iron Corp. coal mines have taken top honors in the 1954 safety honor roll chosen from among 158 mines operating in Colorado. CF&I's Frederick, Morley, and Allen coal mines took first, third, and fourth places respectively for their safety records in the 50,000 or more man hours per injury category.

First place went to the Frederick mine, which operated 146,968 man hours per injury during the year.

The three winning mines each have an active chapter of the Holmes Association for the prevention of accidents. In addition, CF&I carries on extensive first-aid and accident-prevention training of all personnel in all of its Colorado and Wyoming mines.

Recently, in a concentrated program to achieve complete safety training at its mines, The Colorado Fuel and Iron Corp., in cooperation with the U. S. Bureau of Mines, completed an extensive training program in mine safety procedures.

Needed More Pumps

Additional pumping facilities have been installed by Whitedelf Mining & Development Co. at its mine near Clark Fork, Idaho, to handle a heavy flow of water encountered in the new south exploration crosscut on the 800 level. The water course was encountered 700 ft south of the shaft station, about 50 ft short of the estimated position of the downward projection of the Thornton ore shoot. The main south orebody objective is still about 1000 ft ahead.

Moab Uranium Mill

Edward H. Snyder, president of Uranium Reduction Co., and Charles A. Steen, president of Utex Exploration Co., have announced the completion of arrangements to construct one of the nation's largest mills at Moab, Utah, for the processings and concentration of uranium ores.

Meanwhile, American Zinc, Lead and Smelting Co. has acquired 14.6 percent of the common stock of Uranium Reduction Co., according to Howard I. Young, president. Young said that he and his son, Richard A. Young, vice-president of American Zinc, will be directors and executive committee members of Uranium Reduction—Richard Young to be executive vice-president of the new company and in charge of construction, operations and finances. Neither Howard nor Richard Young will receive a salary from the new company.

Uranium Reduction Co. was organized to construct a large uranium processing mill at Moab and to explore and develop certain mining claims in the Big Indian mining district in Utah. Mill design of the new facility has been completed and is based upon extensive metallurgical and pilot plant work conducted during the past year.

"Total capitalization of the new company will aggregate $12,120,000, of which approximately $8,000,000 will be used for construction of the milling plant, and the balance for exploration and development of the mining claims, working capital, and other purposes," Howard Young said.

Foley Bros., Inc. of Pleasantville, N. Y., has contracted to build the new mill with construction starting immediately and completion expected within 12 to 15 months.

The mill will process ores from the Big Indian district and particularly the output of the Mi Vida of Charles A. Steen. Utex Exploration, in which Steen is the principal stockholder, owns a controlling interest in Uranium Reduction Co.

Find New Lime Deposit

West End Chemical Co. has announced the discovery and acquisition of a lime rock deposit in the Argus Range, Inyo County, Calif., just north of their present plant location in Westend, Calif.

Company officials are anticipating transferral of their present quarry operations to the new site in the immediate future. Under consideration is the installation of a rotary lime kiln using natural gas as fuel. Top capacity of this new kiln will be 170 tpd of lime. The carbon dioxide resulting from the rotary kiln operation will be used in the carbonation process, thus eliminating the vertical lime kiln operation. According to company officials, the lime from the rotary kiln will be of the highest quality and will be marketed as pebble and hydrated lime.

New Mexico Convention

The annual convention of the New Mexico Mining Association and the Southwest International Mining Association will be held in El Paso, Tex., September 29-October 1, 1955 according to Milton B. Hopper, El Paso Chamber of Commerce. Headquarters of the convention will be the Del Norte Hotel.

Coal Conversion Plant

The construction of an $11,500,000 processing plant at Walsenburg, Colo., by Cotarco, Inc. of Denver has been announced.

The Walsenburg City Council granted a 99-year lease on 600 acres of city land for the plant, which is expected to revitalize coal mining in Routt County, Colo., and in Southern Wyoming.

The plant will convert 8250 tons of coal daily into fuel gas, light oils, acid oils, creosote, pitch, sulphur and char. Fertilizer, chemical and plastic plants are also expected to be constructed to utilize by-products from the main plant at Walsenburg.

Company officials revealed that more than 75 small mines in Western Colorado and Southern Wyoming have signed contracts to supply coal to Cotarco.

Seek Arizona Uranium

Uranium Corp. of America has announced that a large-scale drilling program has been started on its properties in Arizona in partnership with Standard Ore & Alloys Corp.

Uranium Corp. has several hundred uranium claims in the Sierra Ancha Mountain area near Globe, Ariz., 300 of which are owned in partnership with Standard Ore.

Teaching Safety at Chino

To make good drivers even better, Kennecott Copper Corporation's Chino Mines Division in Santa Rita and Hurley, N. M., is now conducting a series of classes in driver training and driver education for its truck and bus drivers.

Designed to promote driving safety, the program consists of a series of week-long classes for the men who drive busses and trucks ranging from half-ton pickups to the 25-ton Euclids used for ore haulage.

Instruction is under the direction of Henry White, supervisor of employe training at Chino. He is being assisted by Paul Hunter, conference leader.

"The first conferences were held for supervisors," White said, "to give them an idea of what we were trying to do with this program. Now we are concentrating on those who drive trucks and busses for a living. Although many of them have had years of experience, we feel this will make them better, safer drivers."

The seven conferences which make up the course cover a wide range of subjects. The first three sessions held in the classroom deal with the mechanics of the vehicles and a basic study of driving. The next two discussions concern driver firmness and attitude and "the driver as master of the situation." During the last two meetings, a testing program is conducted.

The tests, according to White, are conducted to determine whether the students need further training. Using equipment furnished by the State department of education, drivers measure reaction times, field of vision, reaction to glare, distance judgment and visual acuity. Driving tests determine the student's ability to handle his vehicle in tight places.

W. H. Goodrich, general manager of Chino, said the program is planned to serve a two-fold purpose—to improve driving safety in the Chino operations and to develop an over-all attitude of safety.

"We have found," Goodrich said, "that a safe driver is likely to be a safe all-around worker. Consciousness of driving safely should develop into an application of accident prevention in general."

Old Gold Mine Sold

What is believed to be the only channel-mining gold property still being operated in this country was sold June 2 to Basic Minerals Syndicate of Salt Lake City.

Announcement of the sale came from Hugh Tuttle, co-trustee of the syndicate, who said the purchase was made from Ella Maria Wickham and Otto Brink of Sacramento, Calif.

The mine, located 84 miles northeast of Sacramento near the famous Sutter Mill, was first worked in 1851. More than $3,500,000 in gold has been taken out since that time, Tuttle said.

Mining operations have followed the channel of an underground river over 1½ miles. In places it narrows to a width of eight to nine ft, four ft high. Sometimes it widens to huge room-size caverns. Gold content of the gravel is said to have an average of $6 to $8 per car.

The mine purchase also includes equipment and mine buildings, Tuttle stated. He said the mine is expected to be sold to Twentieth Century Minerals, a company now being formed to operate gold, uranium and mercury mines in several Western States.

New Office for Climax

Construction of a new office building and research laboratory for Climax Molybdenum Co. at Golden, Colo., has ben started to house regional executive offices, the research laboratory and purchasing department offices. Regional offices, now in Denver, will be moved to the new building. The one story and full basement building will contain 10,000 sq ft of floor space and will be of masonry construction.

Gilles Memorial Fund

Establishment of the Verner A. Gilles Memorial Loan Fund at Montana School of Mines has been announced by Dr. J. R. Van Pelt, president. It is sponsored jointly by the Billings Geological Society and the Northern Pacific Railway.

The grant consists of a $400 loan, awarded annually to a student majoring in mining or petroleum geology or geological engineering. It is designed primarily for a senior needing financial assistance to complete his undergraduate education, but may—subject to the discretion of the School of Mines—be given to a junior or graduate student.

Verner Gilles, a graduate of the University of Oregon, made his most lasting and important contributions to geologic knowledge in Montana. He served as chief geologist for the Northern Pacific from 1940 until his retirement in 1954, just a few months before his death. He was also a charter member of the Billings Geological Society. He worked for his own education and the loan fund is a means of continuing his good influence on the younger men of the profession who face similar problems.

Lithium Plant

Stockpiling of lithium ore for the new American Lithium Chemicals, Inc., plant at San Antonio, Tex., was begun in June, according to an announcement by American Potash & Chemical Corp. of Los Angeles, which owns 50.1 percent stock in the lithium company. Construction of the plant is proceeding on schedule, with completion planned for December 1, 1955.

A shipment of nearly 11,000 tons of lepidolite ore has been stockpiled. The ore came from the large lithium ore deposit in Southern Rhodesia, Africa, owned by Bikita Minerals (private) Ltd., in which American Potash & Chemical Corp. has a substantial interest.

Construction of the new lithium plant was begun last March. Processing of ore is scheduled to begin late this year.

Now Anaconda Co.

It is no longer the Anaconda Copper Mining Co. Instead, it is the Anaconda Co.

At its stockholders meeting in Anaconda, Mont., May 18, the copper company voted to change its corporate name from Anaconda Copper Mining Co. to the Anaconda Co. The name change was recommended by the directors because of the company's widening scope of operations.

New Mexico Merger

United Western Minerals Co. of Santa Fe has acquired the properties of three companies and more than 30 individuals in a privately financed transaction involving payment of approximately $2,750,000, according to Alvah A. Simpson, Jr., president. Board chairman of the new company is Gen. Patrick J. Hurley of Santa Fe.

Simpson said the deal involved 500,000 acres of mineral leases, claims and permits in New Mexico, 36,000 of uranium-vanadium properties in Utah, 48,000 acres of oil and gas leases in New Mexico and Utah as well as interests in manganese, mercury and calcite properties in Mexico.

Colorado Plateau Map

A five-color map locating all the better-known deposits of oil, gas and uranium in the Colorado Plateau has been released by the University of New Mexico Publications. The map was prepared by Dr. Vincent C. Kelley of the school's Geology Department and lists and locates 421 structures, including 71 better-known uranium deposits throughout the Plateau.

Supplied by Helicopter

A helicopter will ferry supplies and equipment to the Bear Creek Mining Co. operation in Snohomish County, Wash. A crew of 27 men is starting work in search of commercial quantities of copper and other metals for the company.

The helicopter will be used as a supply link because late snows block the trails of the upper Suiattle River region. Exploratory operations were carried on at the mine last summer, but on a much smaller scale.

Get DMEA Loan

Continental Uranium, Inc., has been granted a governmental loan of approximately $34,000 through the Defense Minerals Exploration Administration for deep hole drilling on one of its properties, Gerald S. Gidwitz, board chairman, announced May 31.

Drilling was scheduled to start about July 1 on Section 2 of the Big Indian division, a tract of 480 acres in San Juan County, Utah. A considerable body of uranium ore was recently discovered immediately to the west of this claim, Gidwitz said, and Continental Uranium's consulting geologists believe there is a good possibility that it may extend onto Continental's property.

This property is contiguous to the famous Steen mine and lies due north of it. It is expected that a series of exploratory holes ranging from 300 to 700 ft in depth will be drilled. The DMEA loan was for three-fourths of the estimated cost of $45,000.

Continental and its subsidiary currently operate two mines, Continental No. 1 and the Rattlesnake mine, both in San Juan County.

Modernize Marget Ann

Mitchell Mining Co. will modernize the Marget Ann Mine, near Butte, Mont., this year, according to E. B. Olmstead, president.

The company's program calls for a new head frame and installation of a larger double-drum hoist. A new skip pocket is planned on the 550-ft level and new ore bins and a conveyor belt from the shaft to the mill will be installed. Mill additions to permit greater recovery of manganese are also planned.

Buy Wyoming Alumina Plant

General Services Administration announced that it has accepted a cash bid made by the Ideal Cement Co. of Denver for the purchase of the Government-owned alumina plant at Laramie, Wyo.

Ideal stated that if its bid was accepted, the plant would not be used for the manufacture of cement but for processing lightweight aggregates.

The recapture clause in the GSA offer provides that the alumina processing machinery cannot be removed from the plant and that the Government can regain possession of the plant in the event of an emergency any time within the next 10 years.

Uranium Mill at Edgemont

A contract covering the construction and operation of a uranium ore-processing mill located at Edgemont, S. D., was signed April 28, 1955, by the U. S. Atomic Energy Commission and Mines Development, Inc., of Denver, Colo. Construction of the plant is expected to begin promptly, with completion scheduled in about ten months.

The new mill, to be owned and operated by Mines Development, Inc., will provide processing facilities for the uranium ores of the Black Hills region, including current ore production which is being stockpiled at the Government-owned ore-buying station at Edgemont. The station has been in operation since the latter part of 1952.

Mines Development, Inc. is one of several private firms which had submitted proposals to the Commission for a mill in the Black Hills area. On April 1, the Commission announced that a contract for the mill was being negotiated with Mines Development.

When the Edgemont mill is completed, it will bring to 10 the number of uranium processing mills operating in the western United States.

Tyler Ranch Tungsten Mill

MacAfee & Co., Consulting Engineers, have been awarded the contract for the engineering, designing and construction of the new 100-tpd tungsten concentrator for the Tyler Ranch Tungsten Mine of Gold Shares, Inc., near California Hot Springs in Tulare County, Calif.

The plant will be ready for operation by August 1.

Moving Dredge

U. S. Smelting Refining & Mining Co. is now dismantling its recently-purchased dredge at Livengood, Alaska, and plans to move it to the company's holdings at Hogatza River this summer. The dredge is being trucked to Fairbanks, then shipped 800 miles by water down the Chena, Tanana, and Yukon rivers, then up the Koyukuk River to a point where it will be hauled overland for a short distance to its final destination. Company officials hope to be ready for digging in the new location in 1956.

Wyoming Uranium Leases

The Wyoming Land Board recently approved 321 uranium leases on state-owned lands. The leases were issued in the following counties — 64 in Sweetwater, 29 each in Natrona and Albany, 28 in Carbon, 34 in Hot Springs, 27 in Fremont, 26 in Johnson, 20 in Lincoln, and 13 in Sublette.

California Cement Outlook Good

The cement outlook for northern California during the next several years looks "good but competitive," Arthur Kroeger, Professor of Marketing in the Stanford School of Business, declared at a Calaveras Cement Co. general sales meeting in San Francisco, June 10.

Northern California is lagging behind other parts of the country in utilization of new construction techniques involving pre-stress, precast, tilt-up, lift-slab and blown systems of concrete application, Kroeger said. He pointed out that wider use of these techniques will increase the general demand for cement.

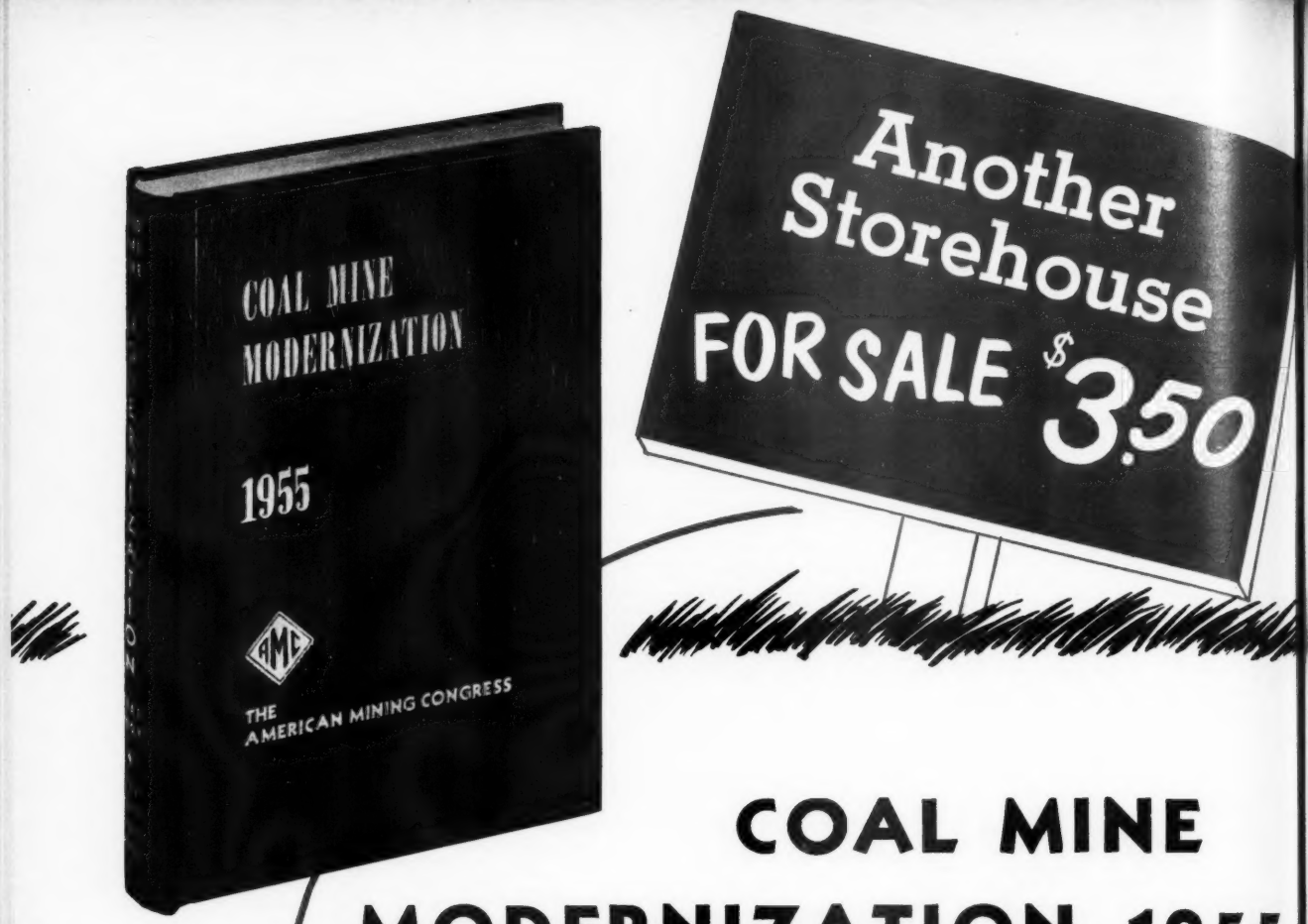
Shipments of cement in northern California during the first quarter of 1955 are running about 30 percent ahead of shipments during the corresponding period of 1954, Kroeger reported.

Mizpah Uranium Contracts Production

Another major uranium strike has been confirmed with the announcement of the signing of a contract to expand mining operations on the Mizpah Uranium and Oil Co. properties in northeastern Wyoming. The contract, made with J. M. McNeill of Tulsa, Okla., calls for minimum shipments of 100 tons of ore per day. Shipment began May 25.

Three shipments of ore were made to the AEC buying station at Edgemont before winter weather halted operations last December.

Mizpah, with main offices in Cheyenne, Wyo., was formed in February 1954, and has been engaged in acquisition and exploration of both oil and uranium properties in Wyoming, Colorado and Utah.



COAL MINE MODERNIZATION-1955

A well-kept storehouse is a place where things are put away, ready and available for use.

Coal Mine Modernization is such a storehouse—chuck-full of mining ideas and information, all carefully prepared and arranged for convenient use by practical mining men. Each year the industry is combed for all that's new in both underground and strip mining operations as subject material for the Mining Congress' Coal Convention . . . and then all the papers and discussions are packed into COAL MINE MODERNIZATION. The 1955 edition will be coming along soon—hence the offer of "Another Storehouse for Sale—$3.50."

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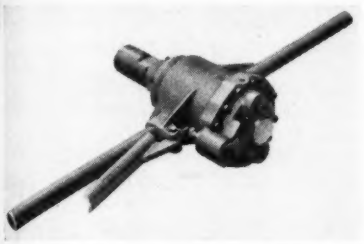
Manufacturers Forum

Hand Held Drill

A new hand-held hydraulic coal drill weighing only 25 lb is being introduced by The Jeffrey Manufacturing Co., Columbus 16, Ohio.

Designated Class A9A, the drill is claimed by the manufacturer to be lighter, faster and more efficient because it is housed in an aluminum casting and is powered by an axial



piston type hydraulic motor. The company reports other features include: (1) valve design which gives variable auger speed and returns drill to free flow instantly when handle is released; (2) operating lever conveniently located alongside of one handle; (3) only two hose connections located on rear of drill housing on centerline with handles for good balance and easy operation.

The A9A will operate from the hydraulic systems of cutters, loaders and other face equipment with pressures of 900 to 2000 psi with 12 to 20 gpm of oil, with a minimum oil tank capacity of 20 gal.

Write to the Mining Sales Division of Jeffrey for Leaflet 893.

Fire-Resistant Belt

A fire-resistant conveyor belt for underground coal mines has been developed by Hewitt-Robins Incorporated in cooperation with coal mine operators and mine safety groups seeking to reduce the fire hazard in coal pits.

The belt is made with neoprene synthetic rubber. It will char if brought into contact with a flame, the company says, but will not burn after the flame is removed.

The belt will be available in various widths and thicknesses to meet the requirements of each mine installation. The cost will be about 15 percent higher because of the additional cost of neoprene over rubber ordinarily used, but it is expected this increased price will be partially offset by longer service life.

Cable Splicing Tapes

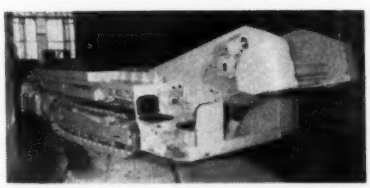
A new line of cable splicing tapes for use with standard steam or electric vulcanizers has been developed by The Okonite Co., Passaic, N. J. Known as Okonite Vulcanizer Tapes, the complete line includes rubber insulation, rubber sheath and colored neoprene sheath tapes.

Designed particularly for splicing mine trailing cables and all portable constructions, Okonite Vulcanizer Tapes may also be used where the immediate, added protection of a vulcanized splice is desired in permanent or fixed cable installations. These tapes are compounded for maximum electrical strength and mechanical toughness and are supplied in a standard one in. width.

Write the manufacturer for samples of the tapes and a copy of Bulletin 5505 which gives details and instructions for use.

Tractor Shuttle Car

The General Electric Company's recently introduced shuttle car, is designed to give the car higher maneuverability, easy control, and allow greater haulage capacity in hauling coal from the mine face to the haul-



age surface, according to G-E engineers.

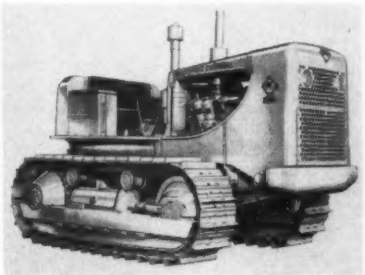
Major improvements, they report, are one piece side frames, one piece improved track carriage frame, simplified controller construction with rotary switches, a new type conveyor motor, and splined drive sprockets.

Maximum load for the shuttle car is eight tons, its basic height is 43 in., and it can be operated from either 250 or 500 v.

New Diesel Crawler Tractor

Allis-Chalmers announces its second completely new crawler tractor this year, the 31,500-lb HD-16, available with torque converter drive and standard transmission. This model follows the 44,000-lb HD-21 tractor and the TS-360 motor scraper announced in February.

The HD-16 has the new Allis-Chalmers 6-cylinder, 844-cu in. Diesel engine which develops 150-net engine hp



at 1800 rpm with torque converter and 140-net engine hp at 1600 rpm with standard transmission.

Maximum drawbar pull of 60,000 lb is obtained with torque converter drive. The standard transmission tractor has a maximum drawbar pull of 31,700 lb at rated engine speed. Under overload, the engine torque increases, thus resulting in additional drawbar pulls up to 35,945 lb at reduced travel speed.

Acquires Lift Truck Line

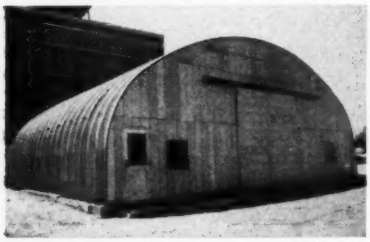
American Pulley Co. of Philadelphia, Pa., recently purchased the assets of Safeway Industrial Equipment Corp. of Chicago, Ill. Through this move American Pulley acquired a complete line of manually and electrically operated hydraulic lift trucks. Under the trade name of "American Safeway," American Pulley plans to serve those markets where more than horizontal handling is required and floor loading or aisle space is limited.

Harry T. Carroll, former president of the Safeway Industrial Equipment Corp., has joined the American Pulley Co. and will operate out of the Chicago address, where stocks will continue to be maintained.

Pre-Fab Warehouse

Development of a new "straight-wall" pre-fabricated steel building, featuring trussless construction and designed to meet storage and warehousing needs in the mining field, has been announced by the Engineering and Research Division of the Wonder Building Corp. of America, Chicago.

The new structure is designed to meet all building code requirements, and will withstand wind velocities up to 125 mph, the company states. Straight-wall construction facilitates mechanized materials handling procedures involving palletization or similar stacking operations. Walls rise



vertically to a height of nine ft before curving to form a semi-circular roof.

It is composed of only two components: sections of two ft wide galvanized, corrugated steel, which make up the building proper, and steel fasteners. The steel sections need only be fastened together to form a completed, self-supporting straight sidewall, and curved roof.

Sizes range in width from 30 to 50 ft, and from 12 to 18 ft in height. The length of individual buildings can be tailored to fit particular needs, from a minimum of two ft to any maximum required.

Uranium Assay Kit

The Radiometric assayer's kit for Uranium Prospectors has been announced by Menlo Research Laboratory, Menlo Park, Calif.

Described as a "Standard Uranium Ore Sample Kit," the new item enables one, the company reports, to determine the percentage of uranium in an unknown mineral specimen.

The kit consists of a measured quantity of natural uranium ore in radioactive equilibrium, the uranium content of which has been precisely determined by certified chemical assay.

With the standard sample, a duplicate but empty container is furnished together with a chart and instructions for use.

In determining the percentage of uranium in a mineral sample, which is known to contain uranium, a sufficient representative sample of the ore is crushed by any convenient means to the approximate fineness of beach sand. The empty container furnished with the kit is filled with the crushed material and closed. The radioactive readings are taken of both the unknown sample and the standard with either geiger or scintillation counter.

The readings noted are referred to the chart supplied with the kit and the percentage of the unknown sample is read off the chart directly.

Liquid Cyclones

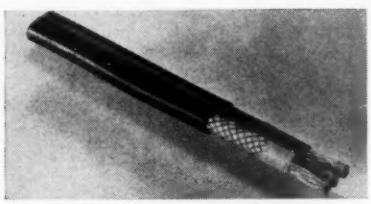
A series of liquid cyclones is now being offered to industry under the trade name of Clust-R-Clone by Centrifugal & Mechanical Industries, Inc.

Clust-R-Clones, according to the manufacturer, have been designed to meet the increasing demands of modern industry for a more efficient means of thickening, de-watering, classifying, separating, densifying, clarifying, desludging and desliming liquid-solid mixtures.

Further details may be had by writing the manufacturer at 146 President Street, St. Louis 18, Mo.

Shuttle Car Cable

A new shuttle car cable has been announced by the Anaconda Wire & Cable Co. The company says the new Security-flex cable embodies several major improvements which reduce the chances of failure.

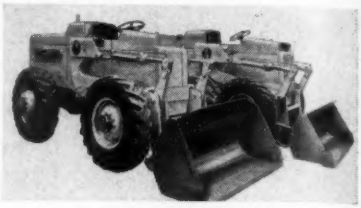


According to Anaconda, "failures in the past resulted, not so much from difficulties with the jacket, as from breakdown of the insulation or conductors. This new cable gives physical toughness on the inside as well as on the outside."

Protection against short circuits is provided in the cable by a patented nylon breaker strip. A high-tensile-strength, fibrous, open-weave web is used over the insulation and fillers and under the jacket.

Add to Tractor-Shovel Line

The Frank G. Hough Co. has announced the introduction of two four-wheel-drive models to their line of "Payloader" tractor-shovels. These new machines are the model HU, with



a one cu yd heaped-capacity and the HH, with a 1½ yd heaped-capacity.

Among the features of these new models is the design which permits 40° of bucket "breakout" at ground level according to the manufacturer. To obtain maximum loads with a minimum of effort, a "pry-out" action is accomplished by using breakout pads on the ground as a fulcrum for leverage. The opposing load forces are thus transferred to the ground through the pads during the "breakout."

Full details and specifications may be obtained from The Frank G. Hough Co., 846 Seventh St., Libertyville, Ill.

Semi-Automatic Hard-Facing

A new line of tubular fabricated alloy wires designed for open arc application through standard semi-automatic welders has been announced by

Stoody Co. Essentially, this is a new process that requires no flux and offers the versatility of manual welding with the control of the full automatic. Depositing 7 to 15 lb of hard metal an hour, this "material-and-method" combination makes possible a high welding speed.

Three materials are now in production at the Stoody Co. plant in Whittier, Calif.—a 50 percent high chromium hard-facing alloy, a 20 percent alloy for hard-facing and a Hadfield nickel manganese for build-up of manganese steel parts. Other materials will be announced as tests now under way are completed.

Almost any standard semi-automatic welder, with minor adaptations, can be used for the process. A welding nozzle, special grooved feed rolls and supplementary wire guides are all

that are required to make the conversion in most cases the company says. Such parts as are necessary can be ordered as a kit from Stoody distributors.

Companies that do even a moderate amount of hard-facing, rock, refractory, cement and manufacturing plants, mines, railroads, drilling contractors and custom welding shops, all may well find a semi-automatic welding machine that has been converted to use tubular alloy wires, a profitable piece of equipment to own.

New Vibrating Screen

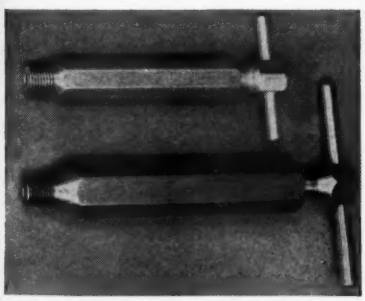
Hewitt-Robins Incorporated have announced the development of a new vibrating screen for screening and sizing coal, ore, chemicals and other bulk materials. The result of four years of research and experimental work in the company's laboratory at Passaic, N. J., the company reports the new screen offers high screening efficiency.

A unique system of rubber and steel springs is used for the screen frame mountings. Controlled resonance induced by a relatively small mechanical exciter produces vibrations with added "kick" to separate materials according to size. All vibration is contained within a dynamically balanced system designed to reduce energy losses, enabling operation with smaller and lighter drives and motors.

The machine, called the "Hi-G," will be made in various sizes from 4 by 10 ft to 6 by 28 ft.

Pump Lubricator

An extension lubricator for injecting lubricant as packing in pump shaft stuffing boxes is being offered by Rockwell Mfg. Co.'s Meter and Valve Division. Previously made up for individual customers at their re-



quest, the lubricator is now available as a stock item.

Available in brass or cadmium-plated steel, the new accessory comes in two over-all lengths. The longer model with larger lubricant barrel is available with either ¼-in.-18 or ⅜-in.-18 N.P.T. thread connector.

For further information, write Meter and Valve Division, Rockwell Mfg. Co., 400 North Lexington Ave., Pittsburgh 8.

Introduce Rock Drill

A new heavy-duty, minimum-weight rock drill is announced by Davey Compressor Co., Kent, Ohio.

Designated as Model DS-38, it is

said to actually be a 4-in-one drill. With the addition of a few accessory parts, it can be converted, without dismantling, from blower type to blast type, or to wet type with manual water valve or to wet type with auto-water valve.

Three rotation speeds — average, fast or slow — can be furnished. Raised center grip and raised tee handles are optional. Five sizes of collar shank chucks are available.

Net weight of the DS-38 with one-in. chuck is 40 lb; length is 21 in. With ⅞-in. chuck, the drill weighs 38 lb and is 20 in. long. Width is 17¼ in. and depth, 5 in.

For further details, write Davey Compressor Co., Kent, Ohio. Ask for Bulletin E-532.

—*Announcements*—

Arthur E. Thode has been appointed industrial advertising manager for the Tractor Division, **Allis-Chalmers Mfg. Co.**, Milwaukee, Wis.

He started with the company in the Tractor Division's office in 1929. He subquently advanced through the Division's various departments.

In 1945 he became editor of *Timber Topics*, external house organ. More recently he has been supervisor of industrial sales literature.

Ted. W. Peterson has been appointed district sales representative for **Leschen Wire Rope Div., H. K. Porter Co., Inc.**, it was recently announced by Gordon N. Dow, Chicago district manager. Peterson's territory will include Minnesota, Wisconsin, eastern Iowa, North Dakota and the upper peninsula of Michigan.

H. K. Porter Co., Inc., has moved the New York district office and warehouse of **Leschen Wire Rope Div.**, to 219 Emmet St., Newark, N. J., according to a recent announcement by Gerry F. Ryan, district sales manager.

Colonel **T. R. Gillenwaters** has been named president and chairman of the board of **Uranium Engineering Co.** of Grand Junction, Colo. Col. Gillenwaters, who formerly served as Industrial Counsel for the firm, took over the reins of the company at a meeting of the board of directors June 10.

Named to the board at the same meeting were: **L. E. Cox**, formerly president of the company; **D. J. Dufford**, Grand Junction attorney, and **Edward Strand** who will also serve as UE general manager.

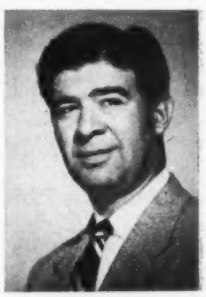
Ernest G. Brown, vice-president, **United States Rubber Co.**, has been elected chairman of the board of directors of Texas-U. S. Chemical Co. He will succeed **John P. Coe**, who retired on June 30.

Brown relinquished his post as general manager of the mechanical goods division of U. S. Rubber, but will continue as a vice-president. He was succeeded as general manager by **G. Allen Lovell** who has been elected a vice-president of United States Rubber Co. Lovell was formerly assistant general manager of the division, a post to which he was appointed last November.

The **Dart Truck Co.**, Kansas City, Mo., announces two changes in top-level management. **George F. Dixon, Jr.**, is the newly elected president, succeeding **Furber Marshall**, former nonresident president, who becomes Chairman of the Board of Directors.

Marshall is president of the Carlisle Corp., Carlisle, Pa., of which Dart is a subsidiary company. For the past year and a half, Dixon has served as vice-president of the Carlisle Corp.

Wilmot Engineering Co., Hazleton, Pa., announces that **A. G. Gilbert** has been appointed general sales manager, in charge of sales for all the company's divisions.



Previously with Heyl & Patterson, Inc., Gilbert has been closely identified with the development and sale of preparation equipment in the bituminous coal industry. He is a member of AIME and is currently serving on various committees of the American Mining Congress.

SEE NEXT PAGE FOR CATALOGS—BULLETINS.

CATALOGS & BULLETINS

CORROSION RESISTANT PUMP. *Dorr-Oliver Incorporated, Barry Place, Stamford, Conn.* This bulletin describes the Olivery Type L Centrifugal Pump, its mechanical features, types and sizes, materials of construction, applications and advantages. According to the manufacturer, advantages include high pumping efficiency, simplified piping arrangements, readily removable cover on the volute type casing, easy priming before and better maintenance of prime during operations, and self-venting.

FLAW LOCATION BY DYE PENETRANTS. *Turco Products, Inc., 6135 South Central Ave., Los Angeles 1, Calif.* This 12-page booklet describes in detail the Turco Dy-Chek inspection method and offers suggestions on how to perform inspections on any metal by the dye penetrant method. This method of flaw detection is: first, apply a penetrating dye to the surface being inspected. After cleaning, a developer is applied to the surface which draws the penetrating dye up out of the flaw. The dye thus bleeds into the developer, marking any defects that exist. Free copies of the flaw location booklet may be obtained at the above address.

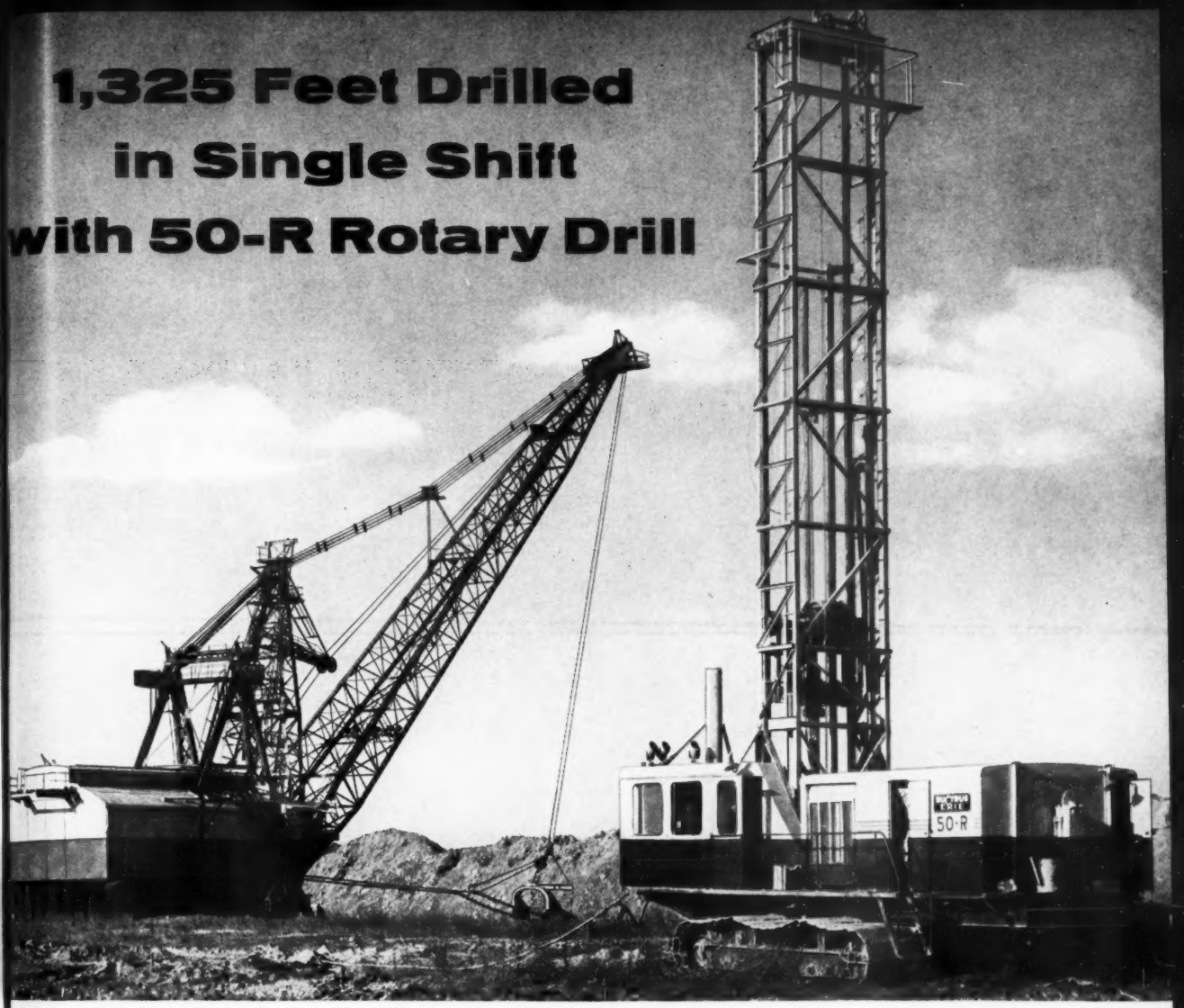
INSTALLING VARIABLE SPEED PULLEY SYSTEMS. *Equipment Engineering Co., 2853 Columbia Ave., Minneapolis 7, Minn.* Bulletin contains instructions for selecting and installing variable speed pulley systems for industrial power take-offs. Seven steps in the process of securing the proper pulley system are listed. Complete tables and specifications on the company's line of Hi-Lo systems are included. For copies of the literature, write to Dept. KP at the above address.

MOTOR PUMPS. *Ingersoll-Rand Co., Cameron Pump Div., 11 Broadway, New York 4, N. Y.* Form 7093-E covers the company's entire line of close-coupled motorpumps from ¼ to 75-hp sizes for delivery of 5 to 2800 gpm. The bulletin is designed to make it easy to select the correct size and model for the job. Detailed pump information is given as well as solutions to typical pumping problems.

SLUSHER CATALOG. *Vulcan Iron Works Co., 1423 Stout St., Denver, Colo.,* has just published Catalog DB-5506 which describes complete electric slusher line. Two- and three-drum single-shaft machines and tandem construction units are included. Slushers are available from 10 to 150 hp.

Index to Advertisers

1,325 Feet Drilled in Single Shift with 50-R Rotary Drill



A total of 1,325 feet drilled in a single shift of 6¾ hours — that's the remarkable performance record set by a 50-R drill last January. Owned by the Maumee Collieries Company, this machine was drilling in overburden consisting of medium hard sandstone with an overlay of hard shale. Holes averaged 40 feet in depth — the average footage drilled per hour was 196 feet. In this single shift, the 50-R completed 33 holes!

This is just one of many case histories which are proving the drilling superiority of the 50-R daily. Behind performance like this are these outstanding features:

- *Ward Leonard electric control on rotation of drill pipe permits drilling at most efficient speed for a given formation.*
- *Pulldown force is hydraulically powered for maximum controlled penetration.*
- *Machine drills continuously for 32⅔ feet before an additional drill pipe section must be added.*
- *Remote-controlled power-driven tool handling unit permits drill pipe sections to be added or removed in a few minutes and without heavy manual effort.*

For complete information on the 50-R, write directly to us. Also ask about the 40-R, a smaller Bucyrus-Erie rotary for drilling 6¾ to 9-in. holes. 19B55C

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A growing number of mine operators, faced with the problem of increased production "out-running" existing haulage facilities, are finding an economical solution in M·S·A MinePhone installations.

This modern communication system, redesigned and greatly improved, permits operators to *safely* step-up present haulage operations to handle increasing tonnage output and offset major investments for new haulage equipment at the same time.

Because the M·S·A MinePhone provides clear, instant two-way voice communication, all haulage decisions are made quickly. The dispatcher is always in contact with motormen, maintenance repair shops, loading points. Motormen can reply while trips are in motion—trips keep on the move, waits on sidings are minimized. Repair needs are relayed quickly. Over-all safety is improved because one message alerts all personnel at once.

We will be happy to demonstrate these, and other advantages, at your convenience. Write or call.

Here are the quality components of a single MinePhone Station

(1) HEAVY-DUTY SPEAKER—made of weather-resistant cast aluminum. Volume control built into housing. (2) PRESS-TO-TALK MICROPHONE—high quality transmission; molded neoprene case; Koiled Kord for safety. (3) RECEIVER-TRANSMITTER—single unit, compact. "Squelch" control maintains quiet when not in use, eliminates background noise. Dust-tight steel housing with mounting cradle for quick installation. (4) RESISTOR BOX—reduces trolley wire DC power to requirements for station. (5) IN-LINE POWER FUSE—combination power cut-off and fuse. Waterproof, dust-tight, molded neoprene case houses a 600 volt 3 amp. fuse. All parts built for rugged, long-life service.

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